DOCUMENT RESUME

ED 410 732 EC 305 792

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TITLE Improving Higher Order Thinking in Special Education Students through Cooperative Learning and Social Skills Development.
PUB DATE 1997-05-00
NOTE 103p.; M.A. Action Research Project, Saint Xavier University and IRI/Skylight Field-Based Master's Program.
PUB TYPE Dissertations/Theses - Masters Theses (042) -- Tests/Questionnaires (160)
EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Cognitive Development; *Cooperative Learning; Curriculum Design; Decision Making Skills; *Disabilities; Interpersonal Communication; Interpersonal Competence; Language Arts; Mathematics Instruction; Primary Education; *Problem Solving; Science Instruction; *Skill Development; Special Education; *Thinking Skills

ABSTRACT

This report describes a project designed to expand higher order thinking skills in five primary students with disabilities in order to increase problem solving and decision making skills. The project incorporated higher order thinking skills into mathematics, science and language arts units, and implemented weekly, cooperative learning techniques and activities. Following the introduction and modeling of a specific thinking skill, students practiced the skill in a content-free cooperative group activity. Eventually, skills were imbedded into a structured mathematics, science, or language arts lesson, where students could demonstrate their understanding of the skill as well as use its application for problem solving. Results of the intervention indicate improved student conduct, successful problem solving in language arts and science, an increase in student use of higher order thinking skills, an improvement in written and oral expression, and a heightened ability to participate more fully in a cooperative group effort while substantiating their ability to use appropriate social skills. Appendices include a teacher survey, a student interview form, a sample lesson for bonding in cooperative groups, and sample lessons and activities for mathematics, science, and language arts. (Contains 18 references.) (Author/CR)

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ED 410 732

IMPROVING HIGHER ORDER THINKING IN SPECIAL EDUCATION STUDENTS THROUGH COOPERATIVE LEARNING AND SOCIAL SKILLS DEVELOPMENT

Leslie S. Ibler

An Action Research Project Submitted to the Graduate Faculty of the

School of Education in Partial Fulfillment of the

Requirements for the Degree of Master of Arts in Teaching and Leadership

Saint Xavier University & IRI/Skylight

Field-Based Masters Program

Chicago, Illinois

May, 1997

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Dedication

This action research project is dedicated to my husband, Tom, whom without his continued support, encouragement, unending supply of patience and love, could not have made this publication possible. He has my utmost love, respect, and gratitude.

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ABSTRACT

This report describes a program for expanding higher order thinking skills in order to increase successful use of problem solving and decision making skills. The targeted population consists of primary students in a self-contained special education classroom, located in a large metropolitan city in central Illinois. The problem of insufficient higher order thinking skills has been documented through data revealing large numbers of students unable to meet the demands of a changing, complex business community.

Analysis of probable cause data revealed students living in poverty, high mobility rates, limited verbal interactions with parents, and limited social skills. Additionally, the data indicated lack of teacher training in higher order thinking skills, insufficient wait-time, and limitations on students' verbal self-expressions.

A review of solution strategies suggested by knowledgeable others, combined with an analysis of the problem setting, resulted in the selection of two major categories of intervention: incorporation of higher order thinking skills into mathematics, science, and language arts units; and the implementation of weekly, cooperative learning techniques and activities.

Post intervention data indicated improved student conduct, successful problem solving in language arts and science, an increase in student use of higher order thinking skills, an improvement in written and oral expression, and a heightened ability to participate more fully in a cooperative group effort while substantiating their ability to use appropriate social skills.

CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The targeted group consists of primary students in a self-contained, special education classroom. These students lack sufficient higher order thinking skills needed for successful problem-solving and decision-making processes. Evidence for the existence of the problem includes teacher observation, teacher journal documentation, surveys, and student interviews.

Immediate Problem Context

This urban school is situated in a centrally-located city in the Midwest. The three story brick structure, built in the early 1900s, stands in the midst of an older neighborhood that accommodates off-campus student housing to undergraduates of the nearby university. This primary unit school serves students in grades kindergarten through fourth grade. With the inception of a pre-school program for at-risk students known as the Star Program, at the start of the 1995-96 school year, the school is now additionally able to accommodate families with pre-school children. The following information about the student population was obtained from the 1995 School Report Card. The student body is made up of 292 students who come from four major racial or ethnic groups. Statistics indicate that 65.0% of the students are Caucasian, 33.7% are Black, 0.3% are Mexican-Americans, and 1.0% are from the Asian/Pacific Islander group.

Almost one -half of the students are from low-income and socially disadvantaged homes. Free or reduced lunches are provided to 46.3% of the children who attend this primary school.

Of the 292 children attending this school, 174 are boys and 118 are girls. An attendance rate of 94.6% is worthy of mention even with a 36.4% student mobility rate. Truancy is presently not a problem as it is at a 0.0% rate.

The targeted school has fourteen full-time teachers with an average of 17.57 years of teaching experience. Six of the teachers have a bachelor's degree with additional hours beyond the degree, while the other eight hold a master's degree with an average of 23.5 hours beyond that degree.

The teaching staff is made up entirely of women; however, the staff is racially-diverse. Eleven of the fourteen teachers are Caucasian, two teachers are Black and one is Japanese-American. The average class size is 20.4 students and the per pupil expenditure for the school is $5,375.

In addition to the fourteen full-time teachers, the school employs a speech pathologist, physical education teacher, art teacher, music teacher, part-time special education resource teacher, one full-time teacher's aide, a school psychologist, a social worker, and a part-time orchestra teacher. This team of educators are extremely dedicated to meeting the needs of all the students and work diligently to improve their own skills so as to foster an even more meaningful education for those they serve.

This group of devoted teachers regularly demonstrate their commitment to education by attending workshops and seminars to improve and expand their teaching methods. Teachers have been trained to uses the strategies of collaboration, conflict resolution, hands-on science programs, Math Their Way, writing portfolios, and now have become adept at using the networking capabilities of computers with their students in a newly established computer lab.

The new computer lab expands the capabilities of staff and students alike. The lab is equipped with sixteen computers and will assist teachers in their efforts to better prepare students to enter the twenty-first century. The computer lab is of great significance to the student body beyond the technological ramifications. For the past two years this school has operated The Accelerated Reader Program through the computer system. This program allows children to interact with the computer to answer comprehension questions about library books they've chosen to read. The user-friendly format along with built-in teacher incentives has made this a very successful program. Teachers are encouraged to see children so enthusiastic about reading. In addition to this particular program, new software is continually being added to reinforce other educational needs.

This primary unit school meets other educational needs with a variety of programs. To accommodate families with working parents, there is a before school and after school Latch Key program provided in coordination with the Young Men's Christian Association. As aforementioned, there is a Star Program for at-risk pre-schoolers. Other programs include a fourth grade orchestra program, and a school-wide reading program called D.E.A.R. (Drop Everything and Read) where the last twenty minutes of the school day are devoted to sharing a book orally with students. There is also an Adopt-A-School-Program. The targeted school has been adopted by the local animal shelter as well as the neighboring university. The shelter provides in-school programs teaching pet responsibility, care and treatment. At the present time, seventy university students provide during and after school tutoring to children in the targeted school on a 1:1 basis.

The Surrounding Community

The community in which the targeted school is located was founded in 1819 and later incorporated in 1845. According to the 1995-96 Visitors Guide, this city is "the oldest continuously inhabited American community west of the Allegheny Mountains."

This primarily industrial and agricultural community has a population of 113,504 people. Statistics indicate this city is multi-culturally diverse. Numbers show that there are close to 309,325 Caucasians, 25,142 African Americans, 2,759 Asians, 587 Native Americans, and 1,359 persons are represented under a grouping of Other. The median household income is $29,886 according to the 1995-96 Visitors Guide.

The community is home to a major university, junior college, and a school of medicine. Additionally, there are 124 public elementary schools, 26 public high schools, and 22 parochial schools.

Historic landmarks are plentiful in this area. The city, named for its original Indian inhabitants, is the oldest settlement in the state. Abraham Lincoln is known to have started his political career in this city. President Teddy Roosevelt also spent time in this city and was so impressed with the beauty of one of its streets, he referred to it as the "World's Most Beautiful Drive."

The membership of the Area Chamber of Commerce is over 1,200 members strong. The not-for-profit organization supports not only the business community, but also supports the educational community. The Area Chamber of Commerce is dedicated to its educational partnership with the local school district through the Adopt-A-School Program. This program is an example of the commitment the community has made to the students of the district. The 1995-96 school year represents the second decade the Adopt-A-School Program has been operating in this district. The Area Chamber of Commerce further demonstrates its dedication to the educational partnership by encouraging over ninety-two businesses, organizations, colleges, and universities to become involved with the local school district.

The targeted primary school is part of one of the largest school districts in this Midwestern state. Statistics from 1995 indicate that 16, 141 students made up the population of the district a year ago. These students attended approximately forty schools in this public school district with a 236.6:1 pupil-to-administrator ratio.

This district has strong parental support and involvement. In addition to the support provided by the Area Chamber of Commerce to the primary schools, this community organization also supports a school-to-work concept program for high school students. Cooperation between local businesses and the local high schools has resulted in the development and operation of three career academies. These academies include Business, Industrial Technology, and Health-Science Academy. The local university also lends its support to the middle schools by providing part-time counseling services to students in need of such services.

National Context of the Problem

For more than a decade, our nation has expressed concern about the lack of higher order thinking skills our children possess when they graduate from the educational system. According to the report, A Nation at Risk: The Imperative for Educational Reform (1983), many 17-year olds did not possess the higher order thinking skills expected of them. Additionally, 40% could not elicit an inference from written information. This national concern has continued to grow and the fear is that today's students are ill-prepared to meet the challenges and changing employment demands of the business community as they enter the twenty- first century according to Resnick (as cited in Ebeling, Moore, and Rieth, 1993). The United Way of America (as cited in Seldin, 1992) has expressed with certainty that future jobs in the most sought out occupations will require the employee to demonstrate creative thinking skills. Perhaps one of the strongest arguments for promoting higher order thinking skills in education is because of reports which indicate American children are falling behind other children in Western countries (Lombardi & Savage, 1994).

There was a time when teachers urged their students to "put on their thinking caps." This simple cue was intended to signal students to be attentive to the facts their teacher taught so they could later regurgitate them on a test. Memorization or

knowledge of the facts, was the known avenue to success. This might help to explain or improve one's understanding of previous educational practices for students with special needs. Consistent with Alley and Deshler (as cited in Lombardi and Savage, 1994, p. 27) "Because they (students with special needs) had difficulty with the development of thinking skills, their instruction has focused on rote memorization rather than processes requiring more complex thinking such as problem solving and decision making." Lombardi and Savage (1994) have concluded that a focus on memorization created a learned helplessness in this population of students as well as a dependence on others for their learning.

Students essentially learned that to be successful in school, or perhaps even in life, one must possess the "right answers." As briefly as five years ago, Swartz (as cited in Seldin, 1992) suggested that textbook companies have intensified the problem by producing textbooks that are merely fact-filled volumes of information for students to recall at test time.

Historically, one of our country's most renowned theorists, John Dewey, suggested teachers create a connection between the learner and what is learned. Furthermore, Dewey felt what students learned needed to be relevant and significant to their lives (Fountain & Fusco, as cited in Costa, Bellanca, & Fogarty, 1992). It stands to reason that students who can make a connection between what they learn and how it relates to their lives, are better able to assimilate information for eventual transfer of learning. According to Resnick (Fountain & Fusco, as cited in Costa, Bellanca, & Fogarty, 1992, p. 239), "For real learning to occur, students must be actively engaged in learning experiences that connect to their present knowledge and bridge to structures needed for future learning."

Rhoades and McCabe report "That several studies have been conducted which consistently indicate that students are not developing the skills necessary for problem solving and decision making" (as cited in Costa, Bellanca, & Fogarty, 1992, p. 43). To

be able to apply one's own thinking to problems inherent in one's life, and to be able to resolve problems and make good decisions is a critical life skill. In the view of Glaser (as cited in Ebeling, Moore, and Rieth, 1993, p. 1) "Good thinking is considered a prerequisite for good citizenship because critical thinking ability helps the citizen to form intelligent judgments on public issues and thus contribute democratically to the solution of social problems." Glaser (as cited in Ebeling, Moore, and Rieth, 1993) also affirms that good thinkers tend to be better adjusted individuals and that good thinking skills contribute to an individual's psychological well-being. Therefore, if the hope and goal of the educational community is to produce graduates with a more than adequate propensity for problem solving and decision making, it would be in our best interest to provide students the opportunities to develop their higher order thinking skills.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In order to collect data about the lack of sufficient higher order thinking skills of special education students in self-contained classrooms, teacher surveys were distributed to sixteen special education teachers seeking their input about the higher order thinking skills of their students. The teacher survey, developed by the researcher, (Appendix A), is comprised of two sections. The upper section allows for teachers to respond to the significance they place on the teaching of higher order thinking skills, and the lower section reflects teacher responses to the changing performances of students in utilizing higher order thinking skills for problem-solving and decision-making situations.

The upper section of the survey provided teachers with four response options. Those options included very important, quite important, not too important, and not at all important. The researcher wishes to bring to the reader's attention that the upper section of the survey, as seen in table one, has only two of the four response options. The table was presented thusly, because the survey participants did not respond to the questions in either of the last two response option columns.

Of the sixteen teacher surveys that were distributed to special education teachers, thirteen were returned to the researcher. A summary of the upper section of

the survey detailing teacher perceptions of higher order thinking skills of their students is presented in Table 1.

Table 1

Teacher Perceptions of Problem-Solving and Higher Order Thinking Skills of Students

Areas of Concern	Very Important	Quite Important
Teaching Thinking Skills	12	1
Teaching Problem-Solving Skills	12	1
Teaching Students Responsibility and Accountability	13	0
Students Solving Own Problems	11	2
Learning Higher Order Thinking Skills	11	2

Of the 13 teachers surveyed, 92% of teachers feel teaching higher order thinking skills and problem-solving skills are very important and equally important as student's solving their own problems when possible. With 100% of the teachers in agreement about the importance of teaching responsibility and accountability, it would seem that teachers are desirous to help their students achieve a certain level of independence in their lives.

The data also appears to indicate teachers are interested in teaching students how to be good citizens, with a unanimous declaration of the importance of teaching responsibility and accountability. Teaching the skills of good citizenship, responsibility, and accountability are of great importance to special education students. It would appear that special education teachers realize the importance of teaching their students functional skills and skills that will help them become productive citizens. It would also seem reasonable that special education teachers are helping students to increase their self-esteem by teaching them skills to foster their independence.

Special education teachers may be of the opinion that if students learn to solve their own problems through higher order thinking, they will better be able to internalize taking responsibility for their actions and understand the concept of being held accountable. Overall, it would appear that teachers of special education students want to provide their students with skills which might promote a positive integration and smooth transition into the mainstream of society.

The lower section of the teacher survey reflects teacher responses to changing student performances and is presented in Table 2.

Table 2

Teacher Impressions of Changing Teacher and Student Performance

Performance Categories	Improved	Gotten Worse	Stayed the Same
Teacher Morale	1	10	2
Student Behavior	1	11	1
Student Self-Esteem	1	6	6
Student Responsibility and Accountability	1	12	0
Problem Solving Skills of Students	1	7	5
Class Participation	2	4	7
Social Skills of Students	1	11	1
Thinking Skills of Students	1	10	2
Transfer of Learning	1	9	3
Student Involvement in their Education	2	10	1

Eighty-five percent of teachers agree that both student behavior and social skills of students have gotten worse. This may indicate a relationship between students lacking appropriate social skills and student misbehavior. Student misbehavior may be

on the rise because of the increase in single-parent homes and the remaining parent may or may not have effective parenting skills. It would also appear that social skills are not being taught or perhaps not reinforced at home, thus creating a rise in poor choices at school.

Teacher morale has gotten worse according to 77% of teachers. With a decline in student behavior as well as teacher morale, it might indicate that negative behavior adversely affects both students and teachers. It would seem possible that the decline in teacher morale might be connected to the increase in student misbehavior. Teachers may feel overwhelmed in their efforts to handle student misbehavior if the number of incidences are on the rise. It is also a possibility that the educational bureaucracy is too controlling, and as a result, they are unable to institute appropriate programs to deal with the increase in student misbehavior.

More than half of the teachers responded that student participation in class has remained the same, while 31% of teachers feel class participation has gotten worse. This would appear to be somewhat contradictory, but may indicate varying degrees of class participation. There may also be a relationship between student participation, thinking skills, and student involvement in education. As table two indicates, 77% of teachers agree that both thinking skills and student involvement in education has gotten worse. This may be an indication that students lack the thinking skills necessary to realize the importance of their involvement. These percentages may also suggest that students lack the thinking skills necessary to participate more fully, and as a result, their self-esteem is also on the decline.

In the category of self-esteem, teachers are almost equally divided. Forty-six percent of teachers feel students have lower self-esteem and 46% feel self-esteem has stayed the same. It would seem that the self-esteem of a student may be difficult to measure. In light of that fact, it may be easier to comprehend the differences in teacher responses.

Sixty-nine percent of teachers suggest that the student's ability to transfer learning from one area to another has gotten worse. There may be a relationship between the transfer of learning skills students lack and the areas in which teachers feel students have done worse. It would seem that the inability to transfer learning from one situation to another could prove detrimental to one's entire educational efforts, as well as attribute to lowered self-esteem.

Considering that thinking skills of students have gotten worse, that they also have difficulty transferring learning to new situations, and that they make poor choices both academically and socially, it should not be at all surprising that student responsibility and accountability have gotten worse according to 92% of the teachers surveyed. It would appear with the decline in student responsibility and accountability and in student involvement, that perhaps there is an additional problem of student apathy.

In considering the areas of student behavior, self-esteem, responsibility and accountability, problem-solving skills, social skills, thinking skills, and transfer of learning, only eight percent of teachers felt there was some improvement. It would seem perhaps this indicates students are coming to school with varied or limited interpersonal social skills.

In order to collect data from students regarding their individual perceptions of themselves in the areas of decision-making, thinking, problem-solving, responsibility, confidence, and socialization, a letter was sent home to parents and guardians (Appendix B) to secure written permission for student interviews (Appendix C) to be conducted by the classroom teacher. The interviews were administered verbally, as well as individually, with the teacher recording the verbal responses of students. Each of the twenty-six questions had the same four response options: always, most of the time, sometimes, or never.

All five parent letters were returned with written permission to conduct the student interviews. A summary of the student interviews is presented in Table 3, which continues onto a second page.

Table 3

Student Interview

Student Questions	Always	Most of the Time	Sometimes	Never
Independent Decisions	0	0	3	2
Parental-Assisted Decisions	4	1	0	0
Decisions w/o Consider. Results	0	1	2	2
Thinks about Own Thinking	2	1	1	1
Think Prior to Decision-Making	1	0	4	0
Think how Choices Affect Others	0	0	1	4
Serious Thinking Produces Confusion	0	1	4	0
Solve School Problems Independently	2	0	1	2
Hope Teacher Solves School Problem	2	0	3	0
Have Teacher Help Solve School Problem	2	0	3	0
Ask Friend to Help Solve School Problem	2	1	0	2
Ask Adult to Help Solve Home Problem	2	1	2	0
Ask Sibling to Help Solve Home Problem	0	0	2	3
Try to Solve Small Probs. Independently	4	0	1	0
Do All Work Asked of Me	4	0	1	0
Ask for Help as Needed	2	0	3	0
Check for my Best Effort	1	1	3	0
Importance of Learning	5	0	0	0
Care About Doing My Best	4	0	1	0

Table 3 (cont.)

Student Interview

Student Questions	Always	Most of the Time	Sometimes	Never
Turn Work in on Time	2	1	2	0
Believe I can Learn	4	0	1	0
Realize Mistakes are Part of Learning	4	0	1	0
Learn from my Mistakes	3	0	2	0
Listen to Other's Ideas	3	0	1	1
Share and Take Turns	5	0	0	0
Try to Get Along w/ Others	4	0	1	0

The interview responses show that 100% of students agreed that they always share and take turns and that they always think learning is important. It would appear that students may reflect upon and perhaps even internalize some of the social and educational reminders their parents and/or guardians verbalize. It would seem that students may have answered this question in the way they believed their teacher wanted to hear the answer. Additionally, because this population of students has a tendency to genuinely want to please others and is always looking for approval, they probably answered truthfully to their way of thinking.

Since 80% of the students responded that they always believe they can learn and know that mistakes are part of learning, it would seem reasonable to consider these students are somewhat confident about their abilities to succeed academically. This may also be an indicator of a strong belief system or reflect the internalization of the daily self-affirmations students recite in class. (Appendix D)

Less confidence is evident from the responses students gave to questions regarding their problem-solving habits both at school and at home. Forty percent of the students state they always seek out a friend, adult, or sibling to help when problems arise at school or home. This reliance on others may support the idea of a lack of

confidence or indicate a lack of independence. It is also possible that these students lack the independent problem-solving skills to handle situations which arise. It is possible that the significant adult or adults in the student's life has told him or her to seek out an adult when a problem arises. While this might indicate a lack of independence, it would also indicate the ability to follow directions of others. Interestingly, 80% of students responded that they always try to solve small problems by themselves. One might gather from this statistic that students are beginning to feel somewhat empowered to resolve the small issues of their lives.

If 80% of students sometimes take time to think before making decisions, and 80% of students never consider how their decisions may affect others, it would appear students are applying faulty reasoning to their decisions or may have egocentric tendencies. Since special education students often learn by examining the parts of a whole, it might be reasonable to consider that when this same student makes a decision in which others may be affected, that he only sees part of the whole picture--that part that involves him--solely.

Sixty percent of the students responded that sometimes they make their own decisions while 80% responded that they always have parents help them make decisions. This may show that students perhaps make simple decisions on their own and consult their parents for the more significant decisions. Given the young ages of the students surveyed, it would be reasonable to assume they relied on their parents for help in making decisions.

When students were asked whether or not they got confused when they had to think real hard, 80% responded with the option of sometimes. Their response was quite sincere and they offered it without hesitation. There is an honesty which is evident in this population of students when it comes to acknowledging their deficit areas. Most of these students are not ashamed to admit that they need extra help in

some content areas and are cognizant that being in their self-contained, special education classroom constitutes getting extra help in those areas.

Students responded to the question about doing all the work asked of them with an 80% agreement that this is something they always accomplish. Eighty percent of students also responded that they always care about doing their best work. This would appear to be an indication that these special education students are conscientious about doing their school work. There is a somewhat obvious distinction that students must be making when it comes to doing one's best versus taking the time to examine one's work to see if one's best work has been accomplished. This would seem to be relevant with 60% of students suggesting that they sometimes check to see if they've done their best work.

Sixty percent of students said they sometimes will ask for help with assignments while 40% responded that they always ask for help. This would seem to suggest that students are not reluctant to ask for help and are probably at least somewhat comfortable in asking for the help. These statistics, however, could demonstrate that students are, or have become, overly dependent on the assistance of others. Inadvertently, teachers may be contributing to or creating a learned helplessness behavior in students.

Student opinions seem to be somewhat split regarding the question of turning work in on time. Forty percent of students responded that they always turn work in on time. Another 40% said that sometimes they turn work in on time. Twenty percent of the students contend that most of the time it is turned in on time. The concept of time may be ambiguous in this particular query. A student may understand "on time" to mean when they've finished their work, before the teacher starts the next subject, before recess, when the teacher calls for it to be turned in, or perhaps according to a pre-established time. Although the question may not have been extremely clear, it

does appear by their responses that the students clearly believed themselves to be turning in work in a more timely fashion than not.

It is encouraging that students feel they are learning from their mistakes with 60% of students acknowledging that this is always the situation. Another 40% of students believe that sometimes they learn from their mistakes. The 40% statistic would seem more realistic, but again, this reflects a student perception of himself or herself. Learning from one's mistakes is often a lifelong endeavor, or at least an ongoing process.

Listening to the ideas of others is something that 60% of students feel they always do. Of course, this may indicate that students merely hear through their auditory system, the sounds others make. It does not necessarily indicate a synthesis of information with other ideas already present in one's knowledge base. Being accepting of other's ideas is also pertinent to this question. Twenty percent of the students admitted that they sometimes listen to the ideas of others, and another 20% said they never listen to the ideas of others. It is possible that students are interpreting the question to reflect "following" someone's ideas, a more active response, as opposed to "listening" to another's ideas which could be considered a more passive activity.

Getting along with others has truly become an important life skill, and if the student responses to this query are an accurate or even somewhat accurate account of the reality of student interactions, then peaceful resolutions should become the norm. Eighty percent of the students responded that they always try to get along with others. The other 20%, said they sometimes try to get along with others. Perhaps the operative word here, is "try." If students are willing to make the attempt to try to get along, it would seem that with additional encouragement and training that the full affect of getting along might be felt by those willing to make the effort. Figuratively speaking, we would be no worse off for the effort.

The researcher wishes to leave the reader of table three with two pertinent thoughts which may affect one's interpretation of the student interview. It would seem possible that given the educational placement of students in a special education classroom, that students may or may not have fully understood the questions being asked them. Additionally, having four response options available, may have inadvertently made responding more of a challenge to these students. No student during the interview process made any verbalizations which would reflect this researcher's additional comments to the reader.

Probable Causes

The students at the focus of the action research are members of a self-contained, special education classroom in a primary school. The self-contained classroom is considered to be cross-categorical, thus serving more than one population of special education students. Specifically, this classroom is comprised of students who have been determined to be educable mentally handicapped (mildly mentally retarded) or learning disabled. These students lack sufficient higher order thinking skills necessary for successful problem-solving and decision-making.

Perhaps one of the most plausible causes attributable to this lack of higher order thinking stems from the fact that nearly 50% of students attending this school are from low-income and socially disadvantaged homes. Of the targeted group, 100% of the students emanate from such home environments.

There are both environmental and hereditary factors discernible in the background of the families of these students, which might substantiate this relationship to the lack of higher order thinking. These factors may also be responsible for inhibiting the learning ability and intellectual development of the students.

Another probable cause which might account for the lack of higher order thinking of the special education students is the inadequate adult influence in the lives of these

children. In the targeted group, only two children, who happen to be brothers, come from a two-parent household. The other children live in single-parent households and one child lives in a two-parent treatment foster care household. Children who reside in single-parent homes generally have a limited exposure to adults. This situation becomes more limiting for the child if the parent is employed. Given the absence of the parent, the child lacks a significant adult in the home to model language skills as well as thinking skills. This void might be compelling enough to be considered a legitimate cause for the lack of sufficient higher order thinking skills of these students.

The literature suggests several underlying causes for the lack of sufficient higher order thinking skills of special education students. Some people in the educational community feel that teachers are the cause of students lacking higher order thinking skills. According to Young (1992), teachers have become dispensers of knowledge, merely presenting the facts for students to memorize. Originally, this was the method chosen by many teachers to educate special education students. It was the method of choice according to Alley and Deshler (as cited in Lombardi & Savage, 1994) because of the extensive belief that it was not possible to develop the thinking skills of this population of students. Swartz suggests (as cited in Seldin, 1992) that the textbook companies contribute to this situation and make it worse by publishing fact-filled textbooks for classroom use. There is also a tendency to teach in the same way in which one has learned; hence, the teaching of facts through memorization is still used by some teachers.

Another probable cause for students lacking higher order thinking skills is due to teachers not teaching higher order thinking skills to students. Teachers themselves may not be trained in the use of higher order thinking skills; therefore, they are unable to teach students these strategies. There are teachers who believe themselves to be teaching thinking skills merely because they ask students to think (Seldin, 1992).

A further review of the literature offers another cause for the thinking skills problem being experienced by special education students. It has been suggested that there is a connection between an increase in television viewing and a decrease in conversation which leads to an interference in one's ability to link ideas (Pogrow, 1988). The ability to link one's ideas is critical to the process of thinking. A child who spends an excessive amount of time in front of a television set will have fewer meaningful life experiences, a more limited vocabulary in which to express himself or herself, and greater difficulty in transferring learning to new situations. Paul (as cited in Lombardi & Savage, 1994), has also observed the decline of verbal interactions between parents and children and the increased solitary play in front of the electronic baby-sitter.

The literature review produced a cause pivotal to the problem. Pogrow states that "Given the growing number of students coming from poor, single-parent households, there is almost no conversation in the homes of most at-risk children - let alone conversations about constructing meaning" (as cited in Costa, Bellanca, & Fogarty, 1992, p. 120). A prolonged absence from exposure to language can be developmentally detrimental to a child. Children need to be in the company of adults, who on a regular basis are actively engaged in conversation so they can develop language skills. The internalization of such skills is critical to the development of thinking. Bacon and Thayer-Bacon (1993) explain that thinking is affected by language and that children need to have many opportunities to practice their language skills. They further rationalize their position, emphasizing that the practice of language skills improves communication skills, as well as thinking capabilities. Gore (1991) also cites meaningful conversation with adults as critical to helping children become successful learners. If a child has only one significant adult in his life, and that adult is routinely absent, there will be no one to model thinking and language processes and no one to encourage the child to explain his thoughts, ideas, or feelings. This loss of

active communication between a parent and child means that thinking and language are not being stimulated; therefore, the ability to develop and use higher order thinking skills to solve problems and make decisions is diminished.

These are some of the probable causes gathered from the site and from the literature.

- 50% of students come from low-income and socially disadvantaged homes
- hereditary factors as related to intellectual development
- single-parent households
- limited exposure to adults modeling thinking and language processes
- lack of significant adult/s in the home
- outdated teaching methods based on the teaching of facts and rote memorization
- use of fact-filled textbooks
- teachers not teaching higher order thinking skills
- teachers not trained in the use of higher order thinking skills
- increased television viewing
- decline in conversation between parent and child

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

Many educators are in agreement that students recently graduating from educational institutions lack higher order thinking skills necessary for problem solving and decision making processes (Ebeling, Moore, and Rieth, 1993). Educators also believe with the tremendous amount of new information available to the public on a daily basis, that higher order thinking skills will be needed to help individuals sort through and make sense of it all (Gough, 1991). This may in part explain the increased interest in teaching higher order thinking skills. Just as there is no single way to solve a problem, the same can be said about choosing the best possible solution to teaching higher order thinking skills to students. There are many diverse ideas being suggested by experts in the educational field, but what educators seem unable to agree upon, is the best approach to use when teaching higher order thinking skills.

In reviewing the literature, one approach some experts feel has merit is the teaching of higher order thinking skills outside of the regular classroom as a separate program and not content specific. One such program is known as the Higher Order Thinking Skills program (HOTS). It was created by Dr. Stanley Pogrow of the University of Arizona in Tucson, for the purpose of addressing the problem of Chapter One (at-risk) students who lacked basic thinking skills (Pogrow, 1988).

This program involves student use of computers, but not as an instructional tool or repetitious drill and practice activity. Computer software is used to encourage interaction between teacher and student. This interaction is referred to as the Socratic method of dialoguing and teachers must be specially trained in the use of this technique to be effective. It seems fitting that the method of dialoguing would carry the name of the great philosopher who used this technique to evoke the thinking of those in his midst. The literature further explains that the transfer of learning does not take place because of student interaction with the computer and its software programming. The transfer is contingent upon the dialoguing between teacher and student. Both language fluency, self-confidence, and thinking skills of students have improved through the use of the Socratic method coupled with computer usage (Pogrow, 1988).

The HOTS program additionally focuses on the areas of metacognition (thinking about ones thinking), inferences from context, and decontextualization (transfer of learning). These elements are significant to the development of critical thinking skills and problem solving skills in students.

Pogrow's HOTS program has proven to be successful not only with Chapter One students (at-risk), but also with most students who have learning disabilities. This has practical application to serve many students in special education programs and is adaptable for use at the primary, middle, and high school levels.

As with the HOTS program, and other separately conducted higher order thinking skills programs, the need for student-to-teacher interaction is vital to the successful teaching of these skills. Costa (as cited in Lombardi & Savage, 1994) suggests that there is a strong connection between one's mental development and their use of language. Additionally, Paul (as cited in Lombardi & Savage, 1994) has noted that verbal interactions between parents and their children have declined, and as a result many children come to school with limited language experiences and have not been exposed to good language and thinking models to assimilate.

For these reasons, some experts believe that the solution to improving higher order thinking skills of students is in allowing them to talk more in class.

Critical thinking is considered a social experience in that thinking is affected and guided by language experiences (Bacon & Thayer-Bacon, 1993). It stands to reason that if students are provided the opportunity to converse more frequently in a classroom situation, that their vocabularies and critical thinking skills will improve because of the social nature of conversation. It is through communication with others that one learns the art of self-expression.

Part of the solution of encouraging "real talk:" in the classroom must come from a teacher's willingness to use less didactic talking. This lecture style of teaching, where the teacher speaks and students listen, promotes a passive learning style and is less effective in providing students an active means of improving their expressive language skills or increasing their higher order thinking skills.

Teachers who provide time for "real talk" in their classrooms, understand the benefits students receive from the experience. As students and teachers begin to "talk," they can share ideas with one another and explain how they arrive at a particular point of view. This allows students to recognize and be open to points of view which differ from their own. The implementation of "real talk" in the classroom can further be considered a stepping stone toward learning to respect other people and their ideas. It also allows teachers to model their thinking for students. In turn, students benefit by listening to other points of view, suspending judgment, extending their vocabulary by learning new words, expanding their knowledge base, and becoming reflective thinkers.

Another popular solution to teaching higher order thinking skills has as its focus the classroom environment, sometimes referred to as the climate of the classroom. The creation of a positive learning climate was alluded to as long ago as 1972 by Haim G. Ginott. In his book, *Teacher and Child,* he affirms, "I have come to a frightening conclusion. I am the decisive element in the classroom. It is my personal approach

that creates the climate " (Ginott, 1972). His insightfulness guided the thoughts of many teachers to be attentive to the learning environment they created for their students. Even today, teachers follow his philosophy and attempt to create a classroom climate conducive to learning, but more specifically, to thinking. This approach emphasizes creating conditions for thinking which are inviting and comfortable. There must be a non-threatening appeal to encourage higher order thinking spawned by carefully developed questions, since this approach does not directly teach thinking skills. Besides creating a climate to foster thinking, teachers using this approach to improve higher order thinking skills make use of wait-time. This is sometimes called "the pregnant pause" (Willis, 1992). The idea behind the concept of wait-time is not to rush the students to respond, but to afford them the opportunity to reflect upon what has been asked, reflect upon their own thinking about the topic, and then share their response. For this reason, it is critical that the teacher ask thought-provoking questions which require students to be reflective thinkers capable of supporting their answers and explaining their thinking.

It is the suggestion of Rhoades and McCabe (as cited in Costa, Bellanca, & Fogarty, 1992) that higher order thinking skills be taught through the process of cooperative learning because of the natural inclination to share one's thinking in this group effort. Students come to their cooperative group with a particular frame of reference. The frame of reference, according to Rhoades and McCabe (as cited in Costa, Bellanca, & Fogarty, 1992) are "the sum total of each individual's experience and knowledge." As students acquire additional knowledge from cooperative group activities and interactions with peers, they attempt to assimilate new information and connect it to past experiences thus creating what Rhoades and McCabe (as cited in Costa, Bellanca, & Fogarty, 1992) refer to as "thinking paths."

In addition to the benefits of teamwork, sharing, caring, and learning that cooperative learning scenarios provide, students are able to share their thinking. In

this way, student's are able to contribute to the thinking paths of their classmates, and because students often have some similar experiences, assimilation should be attainable.

During cooperative group activities, students share their thinking to help group members understand concepts or see how someone arrived at a conclusion. This is referred to as sharing an internal dialogue according to Rhoades and McCabe (as cited in Costa, Bellanca, & Fogarty, 1992). In other words, students share the talking they do in their head as they think. Just prior to the completion of cooperative learning activities, students are guided by their teacher to reflect upon (think about) not only the activity, but also upon their own thinking. This thinking about one's own thinking, metacognition, is a critical aspect of higher order thinking. The final element used at the closing of the cooperative learning lesson is the wrap-up. The purpose of the wrap-up is to prompt a transfer of learning by asking students to think about and record how they might use the elements of the cooperative learning activity in other ways or in different circumstances.

Each of the aforementioned solutions have shown the importance of social interactions to the teaching of higher order thinking skills. Specifically, the use of cooperative learning as a means to teach higher order thinking skills supports Vygotsky's thinking. Vygotsky (as cited in Gore, 1991), suggested that "in order to integrate problem-solving into the cognitive structure of the mind, it must first be practiced in social settings."

Perhaps the most agreed upon solution to teaching higher order thinking skills is through infusion, which occurs when students are given direct thinking skills instruction within the content matter of an already established curriculum (Willis, 1992). Some of the supporters of direct instruction of thinking skills include, Feuerstein, Marzano, Costa, Swartz, and Brandt. Bellanca and Fogarty (1991) believe thinking

skills should be taught explicitly and that infusing those skills into the content of the curriculum helps to facilitate the transfer of learning for the student.

More than twenty years ago, Fraenkel suggested thinking skills could be taught and that all children were capable of thinking at abstract levels even if the quality of thinking was different. Additionally, he expressed his belief that content areas offered opportunities to practice thinking skills and students could be taught strategies to improve thinking skills (Lombardi & Savage, 1994). Other researchers and educators supported Fraenkel's ideas and continued investigating the possibility of teaching and improving thinking skills of students. Barry Beyer developed and later revised his own set of ideas based on Fraenkel's research. Beyer simplified his method into four steps to assist teachers in explicitly teaching students various thinking skills. The four steps included introducing, explaining, demonstrating, and applying the thinking skill (Lombardi & Savage, 1994).

As the idea of direct instruction of thinking skills and infusion into content areas gained interest and approval in the educational community, more and more researchers looked for ways to expand upon and improve the concept. As a result, some researchers felt that since thinking was something that everyone did, but no one could see, that to improve upon the teaching of thinking skills, one should make it visible. Hence, to add a visual element to this concept, the idea of graphic organizers was included in the direct instruction of thinking skills. The use of graphic organizers provides students a way to record and organize their thoughts and enables them to "see" their thinking and use the visual representation to show or explain their thinking to others. Jones, Lyman, McTighe, and Bellanca support the use of graphic organizers (Bellanca & Fogarty, 1991).

Today, Bellanca and Fogarty continue to support the concept of direct instruction of thinking skills and infusion into the content areas. It is their belief that there are essentially four elements significant to the teaching of higher order thinking

skills. Climate is the first of those elements. The establishment of a risk-free learning environment is critical to the success of any educational program. Students need to feel confident that the experiences they share, their opinions, and ideas will be accepted, valued, and welcomed. To reassure students that their input will be respected, Bellanca and Fogarty (1987) suggest the teaching of DOVE guidelines. This is a set of guidelines which dictate appropriate conduct during discussions and in cooperative groups. The "D" in DOVE stands for defer. Students are asked to defer their judgments. They're not to be negative toward others' ideas and not criticize in a demeaning way. The letter "O" refers to opting for the off-beat or original ideas. The "V" stands for vast number of ideas or a variety of ideas. The "E" means expand. The idea is to expand the number of ideas by jumping on the ideas of others. This is known as "piggybacking."

Once, the climate has been established and is conducive to learning, the second element, the teaching of explicit thinking skills, can be introduced. Teachers who take an explicit skills approach usually consult or utilize one of approximately ten popular taxonomies to select specific thinking skills and higher order vocabulary to encourage students to use higher mental processes. Graphic organizers are introduced at this point to help students organize their thoughts and put them down graphically to share with their peers. While each teacher will ultimately decide which thinking skills to teach their students, Bellanca and Fogarty (1987) suggest teaching both critical and creative thinking skills because both kinds of thinking are necessary to problem-solving and decision-making. Once skills have been taught explicitly, students will move to the third element of teaching thinking skills. This element is the structured interaction and it is here that students practice thinking skills in cooperative groups. Students not only practice thinking skills, but practice the necessary social skills one needs to interact appropriately in a cooperative group discussion. Upon completion of the structured interaction, the teacher guides the students through the fourth element. Metacognition,

or the thinking about one's own thinking, is the final element. Metacognition may be the most important element in the teaching of thinking skills. Teachers seek to guide students to process (reflect upon) their thoughts and try to challenge students to consider other areas of their lives where they might utilize the thinking skills being taught. This is known as a transfer of learning, and Bellanca and Fogarty (1987) remind us that both learning and teaching are all about transfer. Being able to bridge the old with the new, and the past with the present, in an effort to move forward from here to beyond tomorrow.

Project Objectives and Processes

As a result of increased instructional emphasis on problem-solving and decision-making processes, during the period of September 1996 to January 1997, the primary special education students from the self-contained targeted group, will increase their ability to successfully utilize higher order thinking skills to complete science, mathematics, and language arts assignments as measured by teacher observation, review of student journals, and teacher journal documentation.

In order to accomplish the project objective, the following processes are necessary:

1. Collect materials that incorporate the use of higher order thinking skills to process information in the areas of science, mathematics, and language arts.
2. Develop mini units of study in science, mathematics, and language arts to provide opportunity to apply problem-solving and decision-making skills.
3. Organize a student outline to follow when given a problem-solving or decision-making activity to resolve through higher order thinking skills.

As a result of increased instructional emphasis on social skills development and cooperative learning techniques, during the period of September 1996 to January 1997, the primary special education students from the self-contained targeted group, will increase successful decision-making and problem-solving skills as they relate to student interaction in the classroom as well as other school sites, as measured by teacher observation and teacher journal documentation.

In order to accomplish the project objective, the following processes are necessary:

1. Collect and review cooperative learning and social skills materials.
2. Design and organize an interactive bulletin board display representing successful decision-making and problem-solving demonstrations of students.
3. Create role-playing situations for students to demonstrate internalization of decision-making and problem-solving skills learned through social skills development and cooperative learning techniques.

Project Action Plan

The action plan which follows, was prepared to address the implementation process involved in achieving the intended project objectives. Both objectives will require an increase in instructional emphasis in the predetermined areas of problem solving, decision making, social skills development, and cooperative learning techniques. The desired outcome should reflect an improvement in the ability of the targeted group to utilize higher order thinking skills when engaged in problem solving and decision making processes.

The researcher will divide the group of nine to twelve students into base groups of three. Composition of the groups will be based on gender, personality, and independent reading level of students to ensure a heterogeneous grouping. Additionally, teacher familiarity with second year students will be considered in base

group selections. Base groups shall remain static for the duration of a nine week grading period, unless something unforeseen should warrant making an adjustment. Task groups will be established by using a combination of cooperative learning techniques to guarantee a random selection. Task group members will rotate regularly as dictated by the scope of the activities students will be involved in completing. The base group and task group have independent functions as well as common purposes. The base group primarily serves as a place to build trust, conduct bonding activities, and develop and refine social skills. (Appendix E) It is also where students will learn about higher order thinking skills. As they move into task groups they will learn to use the higher order thinking skills as a vehicle to increase their success in problem - solving and decision -making situations as well as in the content areas of mathematics (Appendix F), science (Appendix G), and language arts. (Appendix H) The task group members have designated roles, cooperative guidelines to follow, and group activities to complete based on prior instruction in base groups. The purpose of both groups is to strengthen the cooperative efforts of all students, increase and enhance the resource base available to students to solve problems and make decisions, and help them to internalize the benefits.

The skills to be taught and modeled by the researcher include, but are not limited to, listening, sharing, taking turns, cooperation, trust building, encouraging, and higher order thinking skills. To teach and encourage the practice and on-going use of these skills, the researcher will utilize direct instruction, guided practice, activities which incorporate the skills into classroom academics, role playing, student reflection, and constructive teacher feedback.

On a daily basis, during opening exercises, students will orally recite Robert Valett's, "Self-Affirmations" poem (Appendix D) to help create a positive climate in which learning can take place. Students will also be introduced to and expected to follow the responsibilities set forth by the teacher. (Appendix I) A cooperative,

classroom management plan will also be presented and explained so that students can begin to internalize the expectations. (Appendix J)

Cooperative learning instruction will be formally addressed three times per week for 20 to 40 minutes each session. During these scheduled sessions students will receive training in their base groups and practice those skills in task groups. Initial sessions will focus on defining cooperative learning and examining how it differs from both competitive and individualistic learning. (Appendix K) Once the differences have been identified, and the positive benefits of cooperative learning have been made clear, students will be instructed in the basic tenets of cooperative learning. Students will practice these skills at the onset in cooperative groups.

Prior to the implementation of cooperative group activities, the researcher will conduct an introductory lesson of the D.O.V.E. guidelines to encourage and reinforce the concept of teamwork. (Appendix L) The guidelines will be posted in the classroom to serve as a visual reminder to keep the concept of teamwork at the forefront of each school day. It is intended that by following the D.O.V.E. guidelines students will learn to have an appreciation and respect for another person's point of view when it differs from their own.

As the researcher guides the cooperative learning lessons, she will simultaneously model some of the principal social skills significant to the success of cooperative activities. To help students assimilate what the various social skills of cooperative learning will look like and sound like, the researcher will utilize a T-chart. (Appendix M) This graphic representation will be completed by the researcher as students contribute their ideas. As with the D.O.V.E. guidelines, the T-charts will be posted as visual reminders of the social skills necessary for the successful implementation of cooperative learning activities.

Besides instructing students in social skills to enhance cooperative learning activities, the researcher will introduce students to a variety of roles. The function of

each role will be explained and students will have the opportunity and responsibility to demonstrate their understanding of each role during team building activities. An additional goal of the non-academic team building activities is to help students be cognizant of how the interdependence of their individual roles lends strength to their teamwork.

Cooperative learning sessions and social skills development will be on-going throughout the school year. It will not end abruptly at the conclusion of the aforementioned research project. While the initial sessions focus on defining cooperative learning and the social skills necessary to successful cooperative interactions, the remaining sessions will focus on practicing those skills in both non-academic and content areas. The researcher will start teaching the explicit skills of higher order thinking beginning in October, subsequent to the introductory lessons of cooperative learning. The teaching of the higher order thinking skills will coincide with the continuing cooperative learning lessons. Students will review and follow the D.O.V.E. guidelines introduced in cooperative learning during higher order thinking skills lessons. The skills and use of higher order thinking will be taught explicitly to the students while in their base groups. Three content areas identified by the researcher for the purpose of incorporating higher order thinking skills, include science, mathematics, and language arts. Application of higher order thinking skills will occur while students are in their task groups. Higher order thinking skills sessions will be conducted by the researcher a minimum of twice weekly during one or more of the aforementioned content areas and last between 20 to 40 minutes. Both creative and critical thinking skills will be taught and practiced.

To begin the higher order thinking skills lessons, the researcher will establish a positive climate by sharing teacher expectations and reaffirming the D.O.V.E. guidelines. This will be followed by a discussion to verify understanding of the guidelines and clarify any points not understood by the students. The concept of wait-

time will be used by the researcher to afford students the time and opportunity to think before responding to questions. Signals in the form of hand gestures will also be set forth as a means of encouraging all to actively respond and share their thinking with both the teacher and peers. Once the researcher has determined the climate is conducive to a positive thinking atmosphere, the teaching of explicit skills begins. The creative thinking skills to be taught include, but are not limited to, brainstorming, inferring, predicting, and problem solving. The critical thinking skills to be taught include classifying, sequencing, comparing and contrasting, and decision making. After a specific thinking skill has been introduced, explained, and modeled by the researcher, students will have an opportunity to practice and experience the specific skill in a structured activity while in a cooperative group. Each student's introduction to a particular thinking skill will originate in a content free activity. Later, thinking skills applications will take place during structured activities where the skills are imbedded in one of the three previously mentioned content areas. Following the application of the thinking skill, the researcher guides students in techniques which will enable them to metacognate about their thinking skill experience. Some of the metacognition methods are the Plus, Minus, Interesting (PMI), Mrs. Potter's questions, and the Log. These are ways to assist students to reflect upon their own thinking.

It is anticipated that students will ultimately transfer these skills to academic and social situations and effectively use them when confronted with problem-solving and decision-making circumstances.

Methods of Assessment

In order to assess the effects of the intervention, student journals will be kept in the subject areas of science, mathematics, and language arts. Teacher observations will be documented in a journal. In addition, a checklist will be developed to record student interactions in school sites other than the classroom. A cooperative

management system will be implemented to monitor cooperative efforts of students during the intervention period.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

This action research project addressed two objectives. One objective was to increase decision-making and problem-solving skills of students within the classroom and other school sites. The implementation of social skills and cooperative learning were chosen to effect the desired changes.

On the first day of school to help students become acquainted, or in some cases reacquainted with one another, students were given and instructed in the use of a graphic organizer called a people search. The use of this document served two additional purposes. The people search was used as a precursor to the structured social skills lessons that would be taught, and it provided the researcher insight into skills students had retained or may need to review. You will find an example of a student people search in Appendix N.

In addition to the people search, students were introduced to the researcher's expectations for student interactions and conduct. The responsibilities each student was charged with accepting, was posted at the front of the room and discussed at length. A copy of the student responsibilities can be found in Appendix I. The student responsibilities were combined with the cooperative management system as a means of monitoring the conduct grades of students within the classroom. The cooperative management system, known as "Whittier Wages," can be found in Appendix J.

Cooperative learning instruction began the first week of September and was conducted a minimum of three times per week. Twenty to forty minutes were allocated per lesson. Following the introductory lesson in cooperative learning, it became apparent that there was a necessity to utilize the full forty minutes for each cooperative lesson. The increase in time to forty minutes proved adequate and allowed the needed time for debriefing students and provided students time to record their thoughts. The previously mentioned introductory lesson in cooperative learning, known as "Torn Circles," was designed to demonstrate to students the differences in individualistic, competitive, and cooperative learning. That lesson plan can be found in Appendix K. It was also during the second week that the concept of self-affirmations was introduced and expounded upon. Thereafter, on a daily basis before the start of the academic day, students in unison orally recited Robert Valett's Self-Affirmations. After the recitation, the researcher would guide a discussion about student interpretation of the lines and help students to identify ways to empower themselves with these lines to bring about the most positive result. A copy of Robert Valett's Self-Affirmations can be found in Appendix D.

Base groups were established prior to the opening of school, based on the researcher's knowledge of returning students. Composition of the base groups was heterogeneous, while the number of students fluctuated between three or four to a group, based on a continual change in student enrollment. Membership in base groups was to be unchanged for a minimum of one grading period unless an event of such significant proportion would have precipitated a change. A rearrangement would have proven difficult because of low enrollment at the onset. Ultimately, reassignment of group membership in base groups was unwarranted.

Primarily, base groups were developed for the purposes of building trust among group members and strengthening bonds of friendship and loyalty while working toward a common goal. A cooperative group bonding lesson can be found in Appendix E. The

acquisition and refinement of social skills, the principles of cooperative learning, and knowledge of higher order thinking skills also provided reason for the creation of the base groups.

Task groups were also developed, but not comprised of a fixed membership like the base groups. The researcher regularly alternated the placement of students in the task groups to better enable students to learn to cooperate with all of their peers. While the emphasis of the base groups focused on student attainment of knowledge in the areas of cooperative learning, social skills, and higher order thinking skills, the emphasis of the task group was for students to execute and polish those skills acquired in their base groups. Within the task groups, students were introduced to individual job roles such as reporter, encourager, recorder, and supply manager. Initially, designation of these roles was determined by the researcher to ensure that each student became familiar with each role. Eventually, students were charged with coming to agreement on who would take responsibility for each job during a lesson.

The D.O.V.E. guidelines were presented before the first cooperative learning lesson. They essentially outlined for students the appropriate and acceptable manner in which they should conduct themselves within their cooperative groups in an effort to demonstrate teamwork at its best. Lesson plans for introducing the D.O.V.E. guidelines can be found in Appendix L. It was intended that the knowledge gained by students in their base groups, coupled with activities conducted in task groups, would result in increasing the problem-solving and decision-making skills of students.

During the first week of September, teacher surveys were distributed and permission forms were sent to parent/s and /or guardian/s to secure authorization to conduct individual student interviews. A copy of the teacher survey can be found in Appendix A and the parent/guardian letter can be found in Appendix B. Appendix C contains a copy of the student interview. Upon receipt of authorization slips, the researcher conducted individual student interviews.

Social skills instruction also began during the first week in September. Students were provided direct instruction and guidance in the use of social skills. Included in the instruction were the skills of: listening, sharing, turn-taking, encouraging, agreeing, disagreeing, and cooperation. Due to an already full schedule, social skills lessons were incorporated into the cooperative learning time slots and taught jointly until such a time that the researcher felt confident that the students had acquired and mastered a sufficient number of social skills as to demonstrate an ability to conduct themselves in an acceptable manner when participating in cooperative group activities.

To encourage students to participate in social skills lessons, the researcher used a graphic organizer known as a T-chart. Students were requested to use their prior knowledge and skills of observation to express what they thought the previously mentioned social skills both "looked like" and "sounded like." The researcher recorded the student responses on each side of the vertical line of the T-chart. T-charts were posted as visual reminders so that students might be able to mirror appropriate conduct in their cooperative group efforts. A T-chart reflecting good listening can be found in Appendix M.

The remainder of the first half of the grading period was spent acquiring and applying social skills in cooperative group activities of both content-free and academic areas. In the content area of science, students worked cooperatively on a wall mural depicting insects they were studying.

The second objective of the research project was to improve the problem-solving and decision-making skills of the targeted group of students when they were engaged in science, mathematics, or language arts lessons. The implementation of higher order thinking skills was chosen to effect the desired changes.

Higher order thinking skills were explicitly taught while students were in their base groups. These lessons were conducted twice weekly during one of the aforementioned content areas and lasted a duration of approximately twenty to forty

minutes each. Teaching the explicit skills of higher order thinking was scheduled to start at the beginning of October; however, due to the researcher's familiarity with returning students, and their prior exposure to some higher order thinking skills with the researcher, this was begun a few weeks early. The cooperative learning and social skills lessons continued and the higher order thinking skills lessons were additionally incorporated into the schedule.

Both critical and creative thinking skills were taught. While the higher order thinking skills were set forth in the base groups, the practice and application of these skills took place in the task groups. Critical thinking skills which were to be taught, included: classification, sequencing, comparing and contrasting, and decision making. Creative thinking skills which were to be taught included: brainstorming, inference, prediction, and problem solving.

Following the introduction and modeling of a specific thinking skill, students would gain practice of the skill in a content-free, cooperative, group activity. Eventually, the specific thinking skills would be imbedded into a structured mathematics, science, or language arts lesson, where students could demonstrate their understanding of the skill as well as use its application for problem solving.

At the beginning of October, students were instructed in the use of the strategy of visualization as a tool to enhance their ability to recall important information. Students practiced the skill of visualization and extended its application by using a graphic organizer known as an attribute web to record information. In one lesson, students viewed a tray of miscellaneous items for thirty seconds and then used the visualization strategy and an attribute web to record all the items they remembered seeing before the tray was taken away. The students surprised themselves by the quantity of items they collectively remembered seeing on the tray. As a means of extending the practice of visualization with the use of an attribute web, students were asked to visualize their Halloween costume and record its description on the spokes of

the attribute web. The results provided vivid and thorough descriptions that the students enjoyed sharing with one another.

In the content area of science, students were asked to apply their visualization skills and complete an attribute web with information they learned about insects as a culminating assignment in the study of insects. Students completed rather extensive attribute webs in response to the assignment. A student sample of the insect web can be found in Appendix O.

In mid- October, students were introduced to fat and skinny questions. The researcher presented a variety of questions of a general nature that students could answer with ease. Questions were written on marker boards at the front of the room and the researcher recorded student responses beside the questions. By providing a sufficient amount of wait-time, students were able to denote the differences between fat and skinny questions by observing them beside their responses. Students also seemed cognizant of the advantages of using fat and skinny questions to guide their thinking to a higher level. It was also at this point in the month when students demonstrated social skills, cooperative learning skills, and the ability to follow the D.O.V.E. guidelines by deciding upon a base group name and collaborated in designing a group sign.

At the end of the first grading period, the critical thinking skills of comparing and contrasting were introduced. Some students had previously been exposed to this concept and for them it was a review. To facilitate the lesson, the researcher utilized a graphic organizer known as a Venn diagram. Students were directed to a short poem in their reading book about the friendship of two little girls pictured within. Students worked in pairs and with the aid of the Venn diagram recorded the differences between the two girls in the opposite outer circles and their likenesses in the intersection of the two circles. A student sample can be found in Appendix P. At a later date, students

applied this higher order thinking when they designed and completed a Venn diagram in science showing the likenesses and differences between butterflies and moths.

Students spent most of November using their comparing and contrasting skills in different curricular areas. In language arts students compared story characters, in social studies different regions of the United States were compared, and in cooperative learning, miscellaneous items with perhaps only a couple of common attributes were compared and contrasted with one another. In science, students responded in writing to higher order questions about the sensing habits of insects. Toward the end of the month, the critical thinking skill of classification was briefly explored prior to the holiday break. Upon returning, classification lessons were resumed. Students brought items from home and cooperatively classified them into groups and provided them appropriate labels. Later, students applied those same techniques to pictures and finally vocabulary words from across the curriculum.

December was filled with many cooperative activites for the creation of holiday gifts for family members. Additionally, students used higher order thinking in the development of their creative writing papers. Students were responsible for providing written responses to a variety of thought-provoking questions. A brief list of topics can be found in Appendix Q.

In science, students responded to higher order questions about simple machines and their significance to one's life. Students were also challenged to design and write a description of a lever that could be created to make a job of their choosing, easier to accomplish. In the area of health science, students were asked to explain why people eat and what foods they consider to be unhealthy and explain what causes those particular foods to be unhealthy.

During mathematics lessons, students were introduced to tangrams, a seven-piece Chinese puzzle. The students were guided to individually create a paper tangram using paper-tearing techniques.

Students were then challenged to reassemble the pieces into a square by applying the strategies of higher order thinking.

Students were introduced to a three-step problem-solving model. In cooperative groups, students would determine what they felt a particular problem was, that was presented to them on a card. Students then used brainstorming skills to offer ideas to one another about possible solutions. Ultimately, students would narrow their field of solutions, make a choice, explain it, and come to agreement.

Originally, role playing was intended to be used as an avenue of expression and as an opportunity to better understand and experience another person's feelings. It was the intention of the researcher to create situations for students to model in an effort to help them internalize some of the feelings one might experience during a problem-solving situation as well as practice the steps in the problem-solving model. After a couple of pre-planned role playing scenarios, the idea of role playing was abandoned by the researcher because it was determined that utilizing actual student situations as they occurred would maximize the internalizations. The creation of an interactive bulletin board displaying successful demonstrations of students while engaged in problem-solving situations was also abandoned by the researcher. In reconsidering, the researcher decided that it would be more practical for students to resolve problems as they came about and through dialogue that could be guided by the researcher.

As part of encouraging students to use higher order thinking skills for decision making and problem solving, the researcher also guided the students to metacognate upon the experience. This was accomplished by teaching students to record their thinking. Students were instructed in three different metacognitive techniques. One technique, referred to as the Plus, Minus, and Intriguing (or Interesting) or P.M.I. for short, consisted of students reflecting upon the lesson presented and recording their thoughts. The student was asked to record, in a sentence or two, positive aspects of

the lesson. This was considered the "P" or the Plus. Next, the student was to record an aspect of the lesson that perhaps they didn't particularly like; hence, the "M" or the Minus. The "I" was to reflect what the student found to be of interest during the lesson. A blank copy of the P.M.I. can be found in Appendix R. The second metacognitive technique students employed was Mrs. Potter's Questions. Mrs. Potter's Questions were a set of questions students were to consider and respond to when writing their reflections about a particular lesson. The questions served to guide student thinking and assist them in recording the important aspects of the lesson. Additionally, answering Mrs. Potter's Questions was to provide the student some insight into his/her own learning processes as well as interaction with the lesson itself. A copy of Mrs. Potter's Questions can be found in Appendix S. The third metacognitive technique that students used following lessons was the Learning Log. This technique is likened to a diary entry. The Learning Log may be used by a student as a page to record information learned in a particular lesson, it may reflect his/her feelings associated with the learning, it may contain a question the student is pondering, or it may even contain a sketch the student has drawn as a means of recalling some important point. For the targeted students, the researcher felt the P.M.I. and Mrs. Potter's Questions were the most practical metacognitive techniques. The Learning Log was therefore used on a very limited basis. A copy of the Learning Log can be found in Appendix T.

It was intended that students acquire higher order thinking skills and utilize those skills to guide their decisions when faced with problem-solving situations. Students having the capability to think reflectively (metacognate) upon their decisions was also part of the researcher's desire for effecting change in a student's ability to increase their problem solving and decision making skills. Once students have attained the skills involved in using higher order thinking, and applied them in a structured classroom situation, it is anticipated that they will transfer these skills

beyond the classroom walls and into their everyday lives as the need to use them arises.

Presentation and Analysis of Results

In order to assess the effects of social skills development and cooperative learning on the decision making and problem solving skills of students in the classroom, a weekly tally of conduct grades was maintained throughout the intervention with the use of the cooperative management system. These data were aggregated by month and are presented in Table 4.

Table 4

Conduct Grades by Month

Student	Sept.	Oct.	Nov.	Dec.	Jan.
#1	B	B	B	B	A
#2	C	B	B	C	B
#3	A	B	B	A	A
#4	B	A	A	A	A
#5	A	A	A	A	A

The intervention appears to have had a positive effect on the conduct grades of the targeted students. The table indicates that conduct grades taken at the onset in September, improved one letter grade by January, with the exception of one student who maintained an "A" in conduct throughout the intervention period. Another student began and ended the intervention with an "A" in conduct, but the table indicates a decline in October to a "B," and the maintenance of that grade through the month of November. No student had below a "B" average in any one week beyond October with the exception of one student who experienced a life-altering situation in December. By the end of the intervention in January, this student remarkably elevated the conduct grade back to a "B" average.

It was observed by the researcher that students appeared to spend more time on-task when engaged in cooperative activities, and exhibited an enthusiasm noticeably absent in individual class assignments. It was the feeling of the researcher that returning students demonstrated good retention of previously taught social skills and were able to model those skills for their peers.

Notations in the researcher's journal reflect that students as early as October, were demonstrating appropriate social skills during cooperative lessons and successfully following the D.O.V.E. guidelines. A good transfer of learning was noted during science lessons which incorporated graphic organizers.

In order to assess the effects of social skills development and cooperative learning on the decision making and problem solving skills of students in sites other than the classroom, a checklist was maintained throughout the intervention period. These data were collated and are presented in Table 5.

Table 5

Student Incidents Outside the Classroom by Month

Student	Sept.	Oct.	Nov.	Dec.	Jan.
#1	1	2	1	2	0
#2	0	0	1	0	0
#3	0	2	1	0	0
#4	1	1	1	1	0
#5	0	1	1	0	0

The table reflects the total number of incidents which occurred in the lunchroom or on the playground during recess throughout the intervention period. The intervention appears to have had a limited positive effect on students in situations outside the classroom. Student incidents were considered to be minor, and no more than six occurred in any one month during the intervention period. On an individual

basis, students experienced no more than two incidents in the lunchroom or on the playground. It may be that the intervention prevented the number of incidents from being higher.

While adult supervision is provided in the lunchroom and on the playground, both locations are markedly less structured than the classroom. The influx of students from additional classrooms, coupled with the lack of structure, may have been a contributing factor in the number of student incidents at these sites. Student incidents may have been on the rise as a result of over-stimulation. The often hurried pace of the lunch hour may have created anxiety in some of the targeted students, thus influencing them to make poor, impulsive choices. One other factor may have played a role in the higher number of lunch hour incidents. The majority of the targeted students do have diagnosed attention deficit hyperactivity disorders. Of those who take a prescribed medication for their medical disorder, a second daily dose is provided during the lunch hour as it is at this time of day that the early morning dose begins to lessen in strength. It has been the researcher's observation that student's taking medication for attention deficit hyperactivity disorder will likely exhibit increased impulsivity, mood swings, and general anxiety if there has been a considerable amount of time between the first dose wearing off and the need for a second dose.

It is reasonable to consider that the targeted students exhibit better self-control within a structured environment with the researcher present. Students appear to be cognizant of the researcher's high expectations for their success and generally strive to achieve a standard commensurate with the expectations.

Student journals and the observations and notations recorded in the researcher's journal were utilized to assess the effects of higher order thinking skills on the problem solving and decision making skills of students in mathematics, science, and language arts. Notations in the teacher's journal indicate that as early as mid-October, students were exhibiting successful higher order thinking skills in the area of

of science during a unit about insects. Additional remarks about science emphasized a good transfer of learning from the initial content-free activities involving higher order thinking skills to the more specific science lessons about insects. Teacher journal entries indicate that the incorporation of graphic organizers into the higher order thinking skills lessons producced enthusiastic results in students. Use of the Venn diagram enabled students to record their thoughts and ideas by producing a visual diagram. The element of drawing appealed to the creative nature of the students. It is the teacher's belief that student recall, general expression of science knowledge, and overall ability to interact with the materials was enhanced by, and demonstrates the positive effect the teaching of higher order thinking skills can have on students.

Observation of student writings indicate students seemed better able to express themselves when inquiries requiring written responses began with higher order vocabulary. Students were observed to create more reflective, lengthy pieces which went beyond merely touching the surface of a topic. Teacher journal notations suggest that metacognitive strategies such as Mrs. Potter's Questions and the Plus, Minus, and Interesting (PMI) graphic, guided student thinking during the writing process with positive results.

In the area of mathematics, the effect of higher order thinking was not as obvious according to the teacher's journal. Students demonstrated a tendency to rely on previously learned strategies as opposed to adopting new ones. A comment in the teacher's journal made mention of the fact that students did attempt to apply higher order thinking skills when they were engaged in reassembling a tangram puzzle.

Student journals kept in science, mathematics, and language arts provided insight into the effect higher order thinking was having on students. Remarks in student journals were candid and reflect their young thoughts. Journaling appeared to stimulate the metacognitive process and provided students a written outlet to respond to their lessons.

Written comments of students echo similar thoughts and observations of the teacher. Students expressed pride in themselves for having the ability to share ideas, work cooperatively, and have fun while making decisions and solving problems through higher order thinking skills. Students discussed in their journals the satisfaction they derived from adherence to the D.O.V.E. guidelines as they discussed solutions. Besides the positive outcomes of their endeavors, students also pinpointed occasional shortcomings such as talking simultaneously during discussions. Overall, journal entries of students affirmed that the application of higher order thinking skills to the problem solving and decision making processes involved in science, mathematics, and language arts can have a positive effect on the end result.

Given that a positive effect has been dually noted by the students and the teacher, it may indicate that teaching students higher order thinking skills has merit. Additionally, it may be reasonable to suggest that previously surveyed teachers (Appendix A) might be interested in the results of the intervention since concerns they voiced were addressed.

Similar concerns were addressed through the student interview process. (Appendix C) Student responses were given orally and took one of four forms: always, most of the time, sometimes, or never. It appears that the response choice of "most of the time" may have been ambiguous to this targeted population of students. The unintentional ambiguity may possibly have effected the reliability of student responses. For that reason, the student interview was not re-administered as a posttest.

The effectiveness of the intervention is perhaps most noticeably appreciated within the classroom and school building in which it took place. Students were continually offered compliments from teacher colleagues. Compliments were extended to students for exhibiting polite manners, socially acceptable behavior, cooperation, good choices, and kindness. Other building personnel have praised the targeted group of students for their appropriate movement throughout the building. The building

administrator has offered praise for the remarkable improvement of one student in particular who began the school year with a defiant attitude, an unwillingness to cooperate, very little self-esteem, and no desire to complete or turn in assignments. A combination of social skills, cooperative learning, and higher order thinking, provided this student a window of opportunity, thus presenting a clear image of what could be ahead and something to strive for in the future. Happily, this student took an active role in the intervention and proved to be a role model for other students.

Communication with parents has provided additional feedback about the results of the intervention. Parent comments suggest children have experienced improved self-esteem and have made better choices overall, when the opportunity to do so has been present.

Conclusions and Recommendations

Based on the presentation and analysis of the data on social skills and cooperative learning, the conduct of students showed an improvement. The acquisition and application of social skills within the cooperative learning environment enabled students to experience, firsthand, the benefits of a cooperative team effort as well as the feeling of acceptance when conducting oneself in a socially appropriate manner. Students appeared to express a genuine respect for one another during academic and content-free, cooperative learning activities. It seems reasonable that the combination of utilizing acceptable social skills and demonstrating respect for one's fellow student, results in a display of positive student interaction.

Student time-on-task increased during academic engagement, as did their enthusiasm. With the renewed focus and fervor, students extended their knowledge base and their desire to share their ideas with group members. Student participation was more intensive due to the provision of wait-time; thus, allowing a student time to process the inquiry being made of him/her, as well as time to process and deliver a response.

In the cooperative groups, students displayed a willingness to risk. Students were cognizant of the supportive environment of their base groups, and were therefore less hesitant to respond verbally or in writing to tasks asked of them. The positive structure of the base group decreased the apprehension this targeted group of students often experience because of previous failures.

Analysis of the data on social skills and cooperative learning confirmed that the less structure an environment contains, the more likelihood that a greater number of student incidents will occur. While student incidents were not extinguished in non-structured or less-structured areas, certainly the number of possible incidents decreased as did the teacher time necessary to ameliorate the resolution. One may deduce from the analysis that students exercise better self-control in structured environments where a clear understanding of teacher expectations is present.

A conclusion which emerges from the analysis is that an intervention which combines social skills development of students with cooperative learning techniques, results in an increase in the self-esteem of those students.

The presentation and analysis of the data on higher order thinking confirms students were able to increase their problem solving and decision making skills. Students achieved more success when utilizing their critical thinking skills than their creative thinking skills. Students were also more successful in applying higher order thinking skills in the areas of language arts and science rather than in mathematics. This is particularly noteworthy since language arts skills tend to be deficit areas for the majority of students in this targeted group, while mathematics tends to be a strength. Utilization of higher order thinking skills layed the foundation for students to become increasingly retrospective and can be attributed to the refinement of student writings into more reflective pieces.

The ability to use metacognitive strategies enhanced the capability of students to reflect on their thinking. By combining the teaching of higher order thinking skills

with graphic organizers, the students who commonly lack good organizational skills had an improved aptitude and were better able to organize their thoughts and diagram them for further perusal.

One can anticipate that by incorporating social skills, cooperative learning, and higher order thinking skills into a program comprised of special education students, that you will create a learning environment conducive to teaching these students that they can become problem solvers, that they can connect these new skills with their prior knowledge, and take these skills as their own into the world to use on a daily basis, because after all, it's all about transfer.

Those colleagues desiring to implement this intervention, or a similar intervention to increase the problem solving and decision making processes of special education students, should be aware there are modifications to be considered. Determine in advance of any implementation, exactly what behavior you are attempting to modify, and what changes you specifically want to make. Do not combine more than two intervention strategies simultaneously, as these are time-consuming and scheduling modifications can be laborious.

Initially, choose only one content area in which to implement your intervention. Later, as you meet with success or the need to modify arises, it will allow you to try your intervention across the curriculum at your leisure.

Peruse the literature about problem solving and decision making and cross-reference with special education, social skills, cooperative learning, and higher order thinking. Combine what you know about your students and how they learn, with what seems reasonable and doable. More is not necessarily better in this instance.

Plan to implement the intervention in content-free activities before implementing in a specific content area. Students will be more receptive and it will enable you to see the positive connection students make when they realize they have prior knowledge about what you what them to accomplish in a specific content area.

Maintain all of the literature you obtain in a safe, waterproof, location and make sure it is readily accessible at all times. Fully record references as soon as you determine them to be valuable to your research. When utilizing journals, photocopy the front cover with the identifying information as well as the article within.

Keep a journal during the intervention process for inspiration as well as documentation. Do not hesitate to incorporate your feelings and thoughts, not only about the success or shortcomings of the intervention, but about the students, their interactions with each other, with the materials, and your own personal reflections.

Believe in advance that you will be successful. Special education students, while challenging to teach, are our sources of inspiration. They are the reason we do what we do each day.

If I have learned one thing as a teacher, it is... I only hold their small hands for a short while, so I need a firm grasp.

References

Bacon, C.S., & Thayer-Bacon, B.J. (1993). Real talk: Enhancing critical thinking skills through conversation in the classroom. The Clearing House, 66 (3), 181-184.

Bellanca, J. & Fogarty, R. (1987). Patterns for thinking patterns for transfer. Palatine, IL: IRI/Skylight.

Bellanca, J., & Fogarty, R. (1991). Blueprints for thinking in the cooperative classroom. Palatine, IL: IRI/Skylight.

Ebeling, M., Moore, P.R., & Rieth, H. (1993). Considerations in teaching higher order thinking skills to students with mild disabilities. Focus on Exceptional Children, 25 (7), 1-12.

Fountain, G., & Fusco, E. (1992). Reflective teacher, reflective learner. In A. Costa, J. Bellanca, & R. Fogarty (Eds.). If minds matter, vol. I (pp.239-255). Palatine, IL: IRI/Skylight.

Ginott, H.G. (1972). Teacher and child: A book for parents and teachers. New York: Macmillan.

Gore, K. (1991, February). Diskovery: Computers and thinking skills: The hots program. Language Arts, 68, 153-158.

Gough, D. (1991). Thinking about thinking. Research Roundup National Association of Elementary School Principals, 7 (2), 1-4.

Lombardi, T.P., & Savage, L. (1994). Higher order thinking skills for students with special needs. Preventing School Failure, 38 (4), 27-31.

National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. Washington, D.C. : U.S. Government Printing Office.

Peoria Area Visitors Guide 1995-96. (1995). Peoria, IL.

Pogrow, S. (1988, March). Hots: A thinking skills program for at-risk students. Principal, 125-128.

Pogrow, S. (1992). Converting at-risk students into reflective learners. In A. Costa, J. Bellanca, & R. Fogarty (Eds.). If minds matter, vol. II (pp. 117-125). Palatine, IL: IRI/Skylight.

Rhoades, J., & McCabe, M. (1992). Cognition and cooperation: Partners in excellence. In A. Costa, J. Bellanca, & R. Fogarty (Eds.). If minds matter, vol. II. (pp. 43-51). Palatine, IL.: IRI/Skylight.

School Report Card (1995). Whittier Primary School. Peoria Public Schools District #150. Peoria, IL.

Seldin, C.A., (1992). Teaching for thinking: A national priority. NASSP Curriculum Report, 22 (1), 58-63.

Willis, S. (1992, June). Teaching thinking: Educators shift emphasis from recall to reasoning. ASCD Curriculum Update, 1-8.

Young, L.E. (1992) Critical thinking skills: Definitions, implications for implementation. NASSP - Bulletin, 76 (548), 47-54.

Appendices

Appendix A
Teacher Letter/Survey

Prospective Teacher Survey Participant:

This survey is being conducted by a special education teacher in your district who is a graduate student in the Saint Xavier University Field-Based Master's Program. Please take a moment to peruse its content.

The purpose of the survey is to investigate the opinions of teachers regarding student use of higher order thinking skills to successfully solve problems and make decisions. Your decision to participate in the completion of this survey, places no further obligation upon you in the aforementioned research. The completed survey responses and identity of the participants shall be confidential.

Thank you for taking the time to review this survey. If you choose to participate by recording your opinions on the attached survey, please return it at your earliest convenience.

Leslie S. Ibler

Appendix A(cont.)

Teacher Survey:	very important	quite important	not too important	not at all important
How important do you think each of the following is...				
1. How important do you think it is to teach higher order thinking skills?				
2. How important do you think it is that students solve their own problems when able?				
3. How important do you think it is for students to learn higher order thinking skills?				
4. How important do you think it is to teach problem-solving skills?				
5. How important do you think it is to teach student responsibility and accountability?				

****

Appendix A(cont.)

	has improved	gotten worse	stayed about the same
Just your own impression.... would you say....			
6. Teacher morale			
7. Student behavior			
8. Student self-esteem			
9. Student responsibility and accountability			
10. Problem-solving skills of students			
11. Class participation			
12. Social skills of students			
13. Thinking skills of students			
14. Student ability to transfer learning to new situations			
15. Students' involvement in their own education			

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Appendix B
Parent/Guardian Letter

Dear Parent(s) and Guardian(s),

I am currently enrolled in a graduate program at Saint Xavier University. The focus of my research project is to help students increase their higher order thinking skills to enhance their ability to make successful decisions and strengthen their problem solving skills.

Attached to this letter you will find a copy of the student interview form I developed for use in my research project. I ask that you please take a few minutes to review the content of this interview and contact me if you have any concerns or questions.

Student participation in the interview process is voluntary. Your child's name will not be used and the results will be confidential. Your signature is required for your child to participate in the interview. Please return the form below indicating whether your child will be participating. Thank you for your cooperation.

Leslie S. Ibler

Yes, my child may participate in the interview.

_____
(Parent Signature)

No, I prefer my child not participate in the interview.

_____
(Parent Signature)

Appendix C
Student Interviews

Student Interview: Conducted individually with the teacher.

Name_____ Date_____

	sometimes	most of the time	always	never
DECISION-MAKING				
1. I make most of my own decisions.				
COMMENTS:				
2. My parent/s or guardian/s help me to make decisions.				
COMMENTS:				
3. I make decisions quickly without thinking about the results.				
COMMENTS:				
THINKING SKILLS				
4. I think about my thinking.				
COMMENTS:				
5. I take time to think before I make decisions.				
COMMENTS:				
6. I think about how my decisions and choices affect others.				
COMMENTS:				
7. I get confused when I have to think hard about something.				
COMMENTS:				

Appendix C(cont.)

	sometimes	most of the time	always	never
PROBLEM-SOLVING				
8. When faced with a problem at school, I try to solve it by myself. COMMENTS:				
9. When I have a problem at school, I tell the teacher and hope he/she solves it. COMMENTS:				
10. When I have a problem at school, I try to have my teacher help me solve it. COMMENTS:				
11. When faced with a problem at school, I ask a friend to help me solve it. COMMENTS:				
12. When I have a problem at home, I ask an adult to help me solve it. COMMENTS:				
13. When faced with a problem at home, I ask a brother or sister to help me solve it. COMMENTS:				
14. Small problems I try to solve by myself. COMMENTS:				
RESPONSIBILITY				
15. I do all the work I'm asked to do. COMMENTS:				

Appendix C(cont.)

	sometimes	most of the time	always	never
16. I ask for help when I need it. COMMENTS:				
17. I check to see that my work is my best. COMMENTS:				
18. I think learning is important. COMMENTS:				
19. I care about doing my best. COMMENTS:				
20. I turn my work in on time. COMMENTS:				
CONFIDENCE 21. I believe I can learn. COMMENTS:				
22. I know mistakes are part of learning. COMMENTS:				
23. I learn from my mistakes. COMMENTS:				
SOCIALIZATION 24. I listen to others' ideas. COMMENTS:				
25. I share and take turns. COMMENTS:				
26. I try to get along with others. COMMENTS:				

Appendix D
Self-Affirmations

Self-Affirmations

I believe I am a unique and precious human being.

I believe I am my own best friend and my own worst enemy.

I believe I am a loveable and loving person.

I believe I am capable of realizing my potential.

I believe I am self-respecting.

I believe I am responsible for my own behavior.

I believe I am learning from my mistakes.

I believe I am creating a joyful life.

I believe I am an important part of the universe.

by: Robert Valett

Appendix E
Sample Lesson - Bonding in Cooperative Groups

Objective: Students work cooperatively to plan a mock Halloween party.

B Creative thinking skills (brainstorming)
Critical thinking skills (decision-making)

U Unite teams (bonding)
Share materials

I Assign roles
Wraparound for student input

L Mrs. Potter's questions

D D.O.V.E. guidelines
T-chart

Roles: Recorder- records all ideas
Encourager- encourages all to participate and keeps group on task
Reporter- orally shares group ideas with class

Focus Activity

1. Discuss the word "celebration" and elicit ideas about component of holidays. (ie: food, clothes, decorations, etc.)

2. Brainstorm ideas for a celebration of Easter. (include food, clothes, decorations). All ideas are recorded on the overhead and final decisions are voted upon.

Structured Activity

-Each student draws a card with a symbol on it from a box.
-Students match up symbols to find their group members.
-Roles are determined by birth dates of group members.
Oldest- Recorder
Youngest-Encourager
Middle-Reporter
-Each group receives a Party Planning Sheet and one pencil.
-Each group is instructed to discuss, agree, and plan a Halloween party. The recorder is to record the ideas on the planning sheet and at the end of the activity the reporter will use the information to share group ideas with the class.

Appendix E(cont.)

Metacognition

-Each student completed a combination of a P.M.I. and Mrs. Potter's questions.

Closure

Students are reminded that in most instances there is a celebration in their life, once a year, on a special date. (their birthday) It was suggested that students might use the brainstorming and decision-making processes to assist their parent/s or guardians with making these plans.

Transfer

Students will regularly be able to apply the skills of brainstorming, turn-taking, consensus, wrap-arounds, sharing, decision-making, critical and creative thinking skills, and metacognitive reflection, in order to bond in a cooperative effort in any content area and beyond into the world of work.

Appendix F
H.O.T.S. Lesson - Problem-Solving/Mathematics

Focus Activity

-Students are randomly paired.
-Each pair receives 10 pennies, a blank transparency, and a marking pen.
-Teacher displays 10 pennies in a particular configuration on overhead projector.

-Students duplicate configuration on desktop with pennies.
-Students are told they must move one coin at a time in only three moves to end up with
-Students draw their solution on transparency to share and demonstrate their thinking.

Extension

-Students choose different partner and return four pennies.
-Teacher displays configuration on overhead

-Students duplicate design on desktop and are instructed to rearrange coins so that the row and column each have three coins.
-Students are to diagram their solution on transparency to share.

Objective

To apply higher order thinking skills such as predicting, sequencing, inferring, and visualizing to problem-solving situations. (specifically: learn how to fold and tear a square of paper into a Chinese tangram puzzle and re-assemble the torn pieces back into original square.

Structured Activity

-Teacher provides background information about tangram puzzles, its origination in China, and its seven pieces. (a square, a parallelogram, two large triangles, two small triangles, and one medium sized triangle)

-Teacher reviews problem-solving steps and D.O.V.E. guidelines.
-Students work independently, but may assist each other within their groups.
-Each student receives one, 81/2" x 11" sheet of colored paper.

Appendix F(cont.)

-Teacher models the steps for students to follow to make a square from the colored paper by folding and tearing. The teacher then models how to continuously fold and tear the square of paper until the seven pieces of the tangram puzzle have been produced.

-Once completed, students are assigned the task of determining how to re-assemble the seven tangram pieces into the original square.
-Students are offered a more durable set (plastic) to attempt the re-assembling process.

Metacognition

Students complete a P.M.I. or Mrs. Potter's questions.

Closure

Have students identify the shapes of the seven-piece tangram. Inquire as to the shape of the re-assembled tangram. Students are reminded to consider what they know about the definition of the shapes involved in the puzzle.

Transfer

Have students consider how they might use this problem-solving approach in other areas of their life. I'd see them using this approach in geometry, puzzles, word problems, and in a variety of problem-solving situations both academically and outside the academic building.

Appendix G
Sample Lesson/Science

Focus Activity

-Students are asked to pretend that they are going to go to their grandparent's house or special friend's house to stay for three days.
-It is winter and the trip takes three hours as these special people live out of town.
-The student may take only six items with them, and they are responsible for packing all by themselves.
-All items must fit in a paper grocery bag.
-Students receive a paper grocery bag upon which they may draw what they would have packed.
-Everyone shares at the end of the activity.

Objective

Use prediction and problem-solving steps to determine what items you and two other people would need, and how you'd use them, to survive on an island for five days.

Structured Activity

-Students will determine how to distribute jobs, and what jobs will be needed, because they need to practice sharing responsibilities, since they are in this situation together and need to pool their resources as people to survive.

-Once jobs have been decided upon and everyone is in agreement, students may then use newsprint and markers to first draw up a list of a minimum of 15 items they feel they would need to survive the five days on this island. As luck would have it, a couple of things were left on the island since the last group of people were stranded. This group may use any or all of the following items. These items included a funnel, a piece of bubble gum, a small bucket with a hole in it, a pocketknife, and a hammer.

-After compiling the list and agreeing about the importance of the items chosen, the survivors are to make a second list explaining how the items on the first list will be utilized and explain if they are comfort items for survival purposes only, or items they plan to use to get off the island.

-Students are given 30 to 45 minutes to get their survival tactics together.

Appendix G(cont.)

Metacognition

One survivor from each group will present the two lists to the other groups and explain the ideas they have for surviving. Students will complete a short stem statement or fill in a P.M.I. about their experience.

Closure

Teacher debriefs about the general importance of being able to utilize problem-solving skills and using prediction to anticipate what might happen next. Students are asked to rate themselves by making a likert scale and indicate where they feel they fall on a scale of 1 to 5 with 5 being high, in terms of being a good problem-solver.

Transfer

The ability to make predictions and to anticipate what might happen next are critical abilities to acquire and shape. Students who anticipate and perhaps even use visualization to see a goal will probably be good problem-solvers. Prediction and problem-solving skills are vital when students sit behind the wheel of a car. Problem-solving is a functional life skill that all individuals need to possess and polish.

Appendix H
Sample Lesson - Language Arts

Focus Activity

-Students viewed a tray of items for approximately one minute. Then the tray was removed.
-Students were then asked to contribute, in a round robin fashion, what they saw, and the teacher recorded their responses on the board, so there would be no duplication. (brainstorming)
-Next, students were asked to consider how the items they viewed were alike or why the teacher grouped the particular items together.(brainstorming)
-All responses were accepted.

Objective

Utilize the higher order thinking skills of brainstorming and classification during a cooperative learning lesson in language arts.

Structured Activity

-Cooperative groups were determined by students numbering off by threes and getting together with like numbers.
-Roles included a recorder, encourager, and reader. Students determined their roles with a friendly, quick game of paper, rock, and scissors.
-Each group received a brainstorming paper, a classification paper, and one pencil.
-Readers would read how each of six boxes was labeled. (by classification)
-Next, recorders would guide students in a wrap-around fashion so each group member would contribute two suggestions for items that would fit the classification of the box. The recorder would write all six ideas in one star on the brainstorming sheet. Then, students had to agree on which three were the best answers in each star and record them in the box with that classification.
-This procedure was used throughout the activity.
-The encourager kept the group on-task and feeling positive.
-The teacher, as facilitator, guided the activity and provided input as needed.

Metacognition

Students completed P.M.I.'s about the experience. The teacher also guided students orally through Mrs. Potter's questions.

Appendix H(cont.)

Closure

All groups shared their top three responses from each classification. Teacher reminded students about the helpfulness of using a graphic organizer to record their ideas, (brainstorming) and also the need to classify things in general in one's life as a form of organization.

Transfer

-Brainstorm topics to write about in creative writing.
-Use the brainstorming and classification skills in combination again as we move to the rock and mineral unit in science.
-Brainstorm a shopping list for needed items to make a recipe.

Appendix I
Responsibilities

Mrs. Ibler - Room 301

Responsibilities

1. Respect rights and responsibilities of others.
2. Follow directions of those in charge.
3. Keep hands, feet, and objects to self.
4. Use polite language.
5. Treat one another kindly.
6. Quiet in line when moving through the building.
7. Be prepared for class and work hard.
8. Ask for help if you need it.
9. Raise your hand to speak or leave your seat.

**Do things that allow students to learn.
**Do things that allow teachers to teach.
**See me if you can't do the above.

Consequences

1. Verbal warning.
2. Make a choice.
3. Time out to think.
4. No recess.
5. Peace table discussion or sharing circle.
6. Call home.
7. See principal.

Rewards

1. You feel good about yourself.
2. Your teacher and your family are proud of you.
3. You have control of yourself.
4. Verbal praise.
5. Good news notes.

Appendix J
Whittier Wages

How to Earn Whittier Wages

1. Work cooperatively until 10:00 a.m. break.
2. No problems at recess 10:30 - 10:45.
3. Work cooperatively until lunch 12:15.
4. No problems at lunch inside or outside - 1:00.
5. Work cooperatively until 2:00 p.m. break.
6. Work cooperatively until dismissal - 3:15.

****

Payment Schedule:

3 Whittier Wages in the a.m. = * on desk chart
3 Whittier Wages in the p.m. = * on desk chart

Shoot for Good Behavior: (w/ Nerf ball at hoop)

6 Whittier Wages = 3 shots
5 Whittier Wages = 2 shots
4 Whittier Wages = 1 shot
3 or < Whittier Wages = 0 shots

Appendix K
Torn Circles

Focus Activity

-Each student is given 10 playing cards and told to build a house of cards on their desktop. After a few minutes, students may observe what their peers created--if anything.

-Next, the class is divided in half and two teams emerge. The goal is to see which team can build the tallest house of cards within five minutes, using 20 cards. Five minutes later, the team with the tallest house is declared the winner of the competition.

-Finally, all students come together, and the teacher provides an additional clue to cut slits on the edges of the cards, so the cards can be given some durability and fit into one another. The entire class works together to make a house of cards.

Objective

To comprehend, compare, and contrast, three types of interactions (cooperative, competitive, and individualistic) and the feelings one derives from each interaction. To consider other areas in which to use a cooperative interaction.

Structured Activity

-Displayed transparency containing descriptions of three types of interactions:

Cooperative: when two or more people work together toward a single goal.
Competitive: when one or more persons work against each other toward a single goal.
Individualistic: when one person works alone to reach a goal.

-Elicited from students, sports or other activity-related examples of the three types of interactions.
-Students chose one of two colored unifix cubes to determine which group they would be a member of for the activities.
-Role assignments were made by the teacher and included a material handler, reporter, and an observer.
-Explained to students that they would be involved in three separate interactions and that they should focus on how they feel.

Appendix K(cont.)

Activity #1- Competitive Task

-Material handlers distribute a piece of scratch paper to each group member.
-Students are instructed to each tear a circle as round as possible and told that the "winning circle" will be judged by others.
-Each group must select the "one" roundest circle.
-Once a winner is chosen from each group, the "winning circles" are placed on the overhead for final judging.
-The "best circle" is judged by applause.
-Once completed, students use a wraparound to discuss how they feel about the outcome of the activity and what they felt during the activity.
-Observers share descriptive words group members used to explain their feelings about the competitive task and the teacher records them on the board.

Activity #2 - Individualistic Task

-Each student receivés a piece of scratch paper and is instructed to tear it by following a specific set of criteria. It must have two straight sides, two curves, and a hole to get 100% credit for the task.
-Each piece of paper is put on the overhead, one at a time, and it is determined if each individual has met the criteria previously established to earn the 100% credit.
-Upon completion of the activity, students again use a wraparound to discuss what they're feeling.
-Observers provide descriptive feeling words of group members to teacher to record on the board.

Activity #3 Cooperative Task

-After receiving their paper, each student is instructed to tear a piece to contribute to a final group collage design representing what "cooperation" looks like.
-Each group put their heads together and discussed what they thought "cooperation" might look like and created their designs.
-Interesting results: One group made a basketball, back-board, and a hoop, and explained cooperation as being likened to the team effort needed to play basketball. The other group created a house, a roof, and a chimney, and likened cooperation to being like the foundation one needs for a family--the stability of a good home. WOW!!!!
-Observers provide words to teacher once again to record on the board.

Appendix K(cont.)

Metacognition

The teacher helped students to process the words they used to express their feelings during the three different activities and guided them to compare and contrast what they internalized during the different activities and how that related to the differences between working alone, working against someone or a group of individuals, or working together beside someone toward the achievement of the same goal.

Closure

The students concluded that the cooperative interactions felt good and better than competitive feelings, and less stressful than individualistic tasks. Positive remarks were shared all around for the entire lesson. The teacher merely restated what the students expressed about two heads being better than one.

Transfer

Students will most likely experience all three kinds of interactions with people, and it is hoped that they will decide which works best for them, and in which situation. Most importantly, the students need to transfer the concept of cooperation to social areas of their lives along with the educational areas. Cooperative skills will become extremely important as they go beyond the school walls and attempt to participate in the world of work and to establish relationships with people.

Appendix L
D.O.V.E. Guidelines

Focus Activity

I drew a picture of a dove with an olive branch in its mouth and asked students if they recognized what I had drawn. They identified it as a bird, and did eventually come up with it being a dove. Next, I inquired if this represented something important. Yes, it represented the concept of peace. I now had their attention.

Objective

I explained D.O.V.E. was an acronym that would serve as a reminder how to conduct themselves and how to interact with their group members during cooperative activities.(peacefully)

Structured Activity

-Teacher defined the word acronym. Reminded students about acrostic poems they had done for Grandparents Day in November.
-Chose a student name and reviewed by demonstration how to write an acrostic.
-Displayed D.O.V.E. in a vertical display and defined and explained what each letter was to mean.

Defer judgment; No put-downs

Opt for original idea

Variety of ideas

Expand ideas of others; piggy-back

(Following this lesson, students immediately practiced the skill in the T-Chart lessons.)

Metacognition

To assist students in thinking about what was being taught, demonstrated, and soon to be practiced, the teacher guided students through a series of questions for them to ponder, prior to completing a stem statement. Questions included:
-In your own words, explain what each letter means?
-How do you think the D.O.V.E. guidelines will help you during classroom activities?
-What might happen if we didn't have the D.O.V.E. guidelines to use?

Appendix L(cont.)

Closure

Complete stem statement: It will be important to use the D.O.V.E. guidelines during cooperative activities because...

Transfer

I anticipate students using the concept not only in the classroom, but utilizing it in social situations away from the classroom- in conversation on the playground, at lunch, at home. It's significant to show a willingness to be a good listener, to contribute, and to show patience and kindness.

Appendix M
T-Chart

Focus Activity

-Conduct a role-play situation in front of the class.
-Instruct student A to be non-attentive (tie shoes, hum, turn to talk to someone beside her, get in desk, etc.) as student B excitedly attempts to tell student A about the really neat time she had at a friend's brithday party.
-After three minutes, have role-playing situation conclude and ask students to explain what each student was doing and how it might feel to be student A or student B.

Objective

Learn and demonstrate the skills involved in being a good listener when actively engaged in a cooperative group situation.

Structured Activity

-Teacher introduces a T-chart (graphic organizer) on the chalkboard by drawing a large upper case T.
-It is explained that information will be placed on both sides of the vertical line about the topic written across the horizontal line - which is "Good Listening."
-Teacher guides students to tell her what good listening "looks like." Student ideas are written by the teacher on the left side of the T-chart.
-Once the left side is completed, students are challenged to assist the teacher in completing the right side by telling what good listening "sounds like."
-The teacher again, accepts all responses.
-A completed chart may look similar to the one depicted on the following page.
-Following the completion and discussion of the chart, students are engaged in role-playing situations that reflect students using good-listening skills.

Metacognition

Students are to draw a picture of what good listening looks like and explain the steps they will take to improve their own listening skills.

Closure

Teacher concludes lesson by asking students to sit quietly for two minutes and merely listen to the sounds in their environment. After two minutes, they were to make a list of what they heard. This was purposefully done prior to the dismissal bell. Was it important to hear that?

Appendix M(cont.)

Transfer

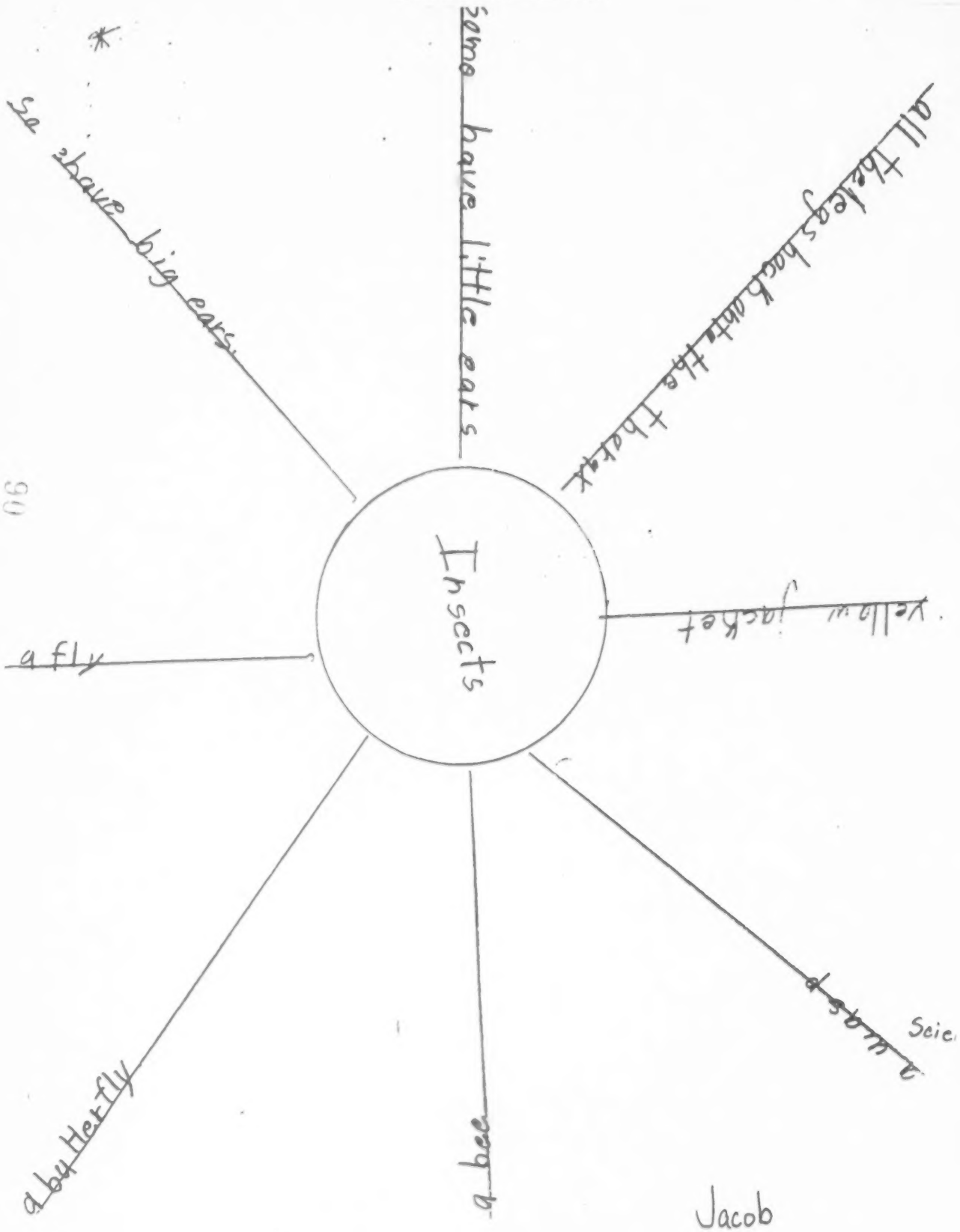
This is a very important life skill that is applicable in school, at home, in the community, in the workplace, and in any situation where oral communication is taking place.

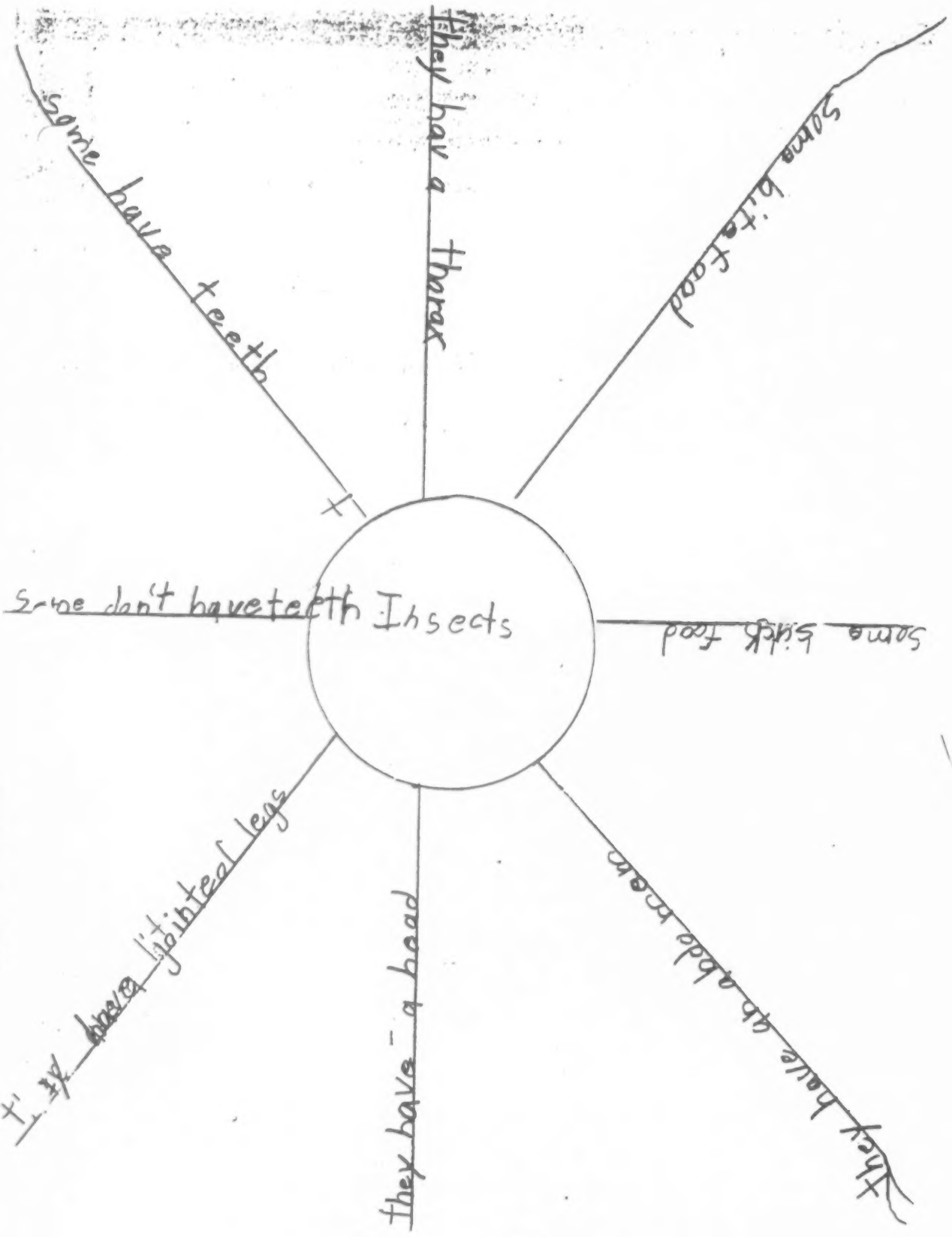
Appendix N
People Search

Find Someone Who...
(Have them sign off if they are the someone who...)

Went out of town over the summer	Read a book over the summer and can tell you about it	Had a summer birthday and can tell you the date
_____	_____	_____
Has a big brother or sister	Can tell you what time it is	Can explain what coins make 25 cents
_____	_____	_____
Can name the state we live in	Can explain how to get to Bradley Park from school	Knows the meaning of cooperation and can explain it
_____	_____	_____

Appendix O
Student Attribute Web





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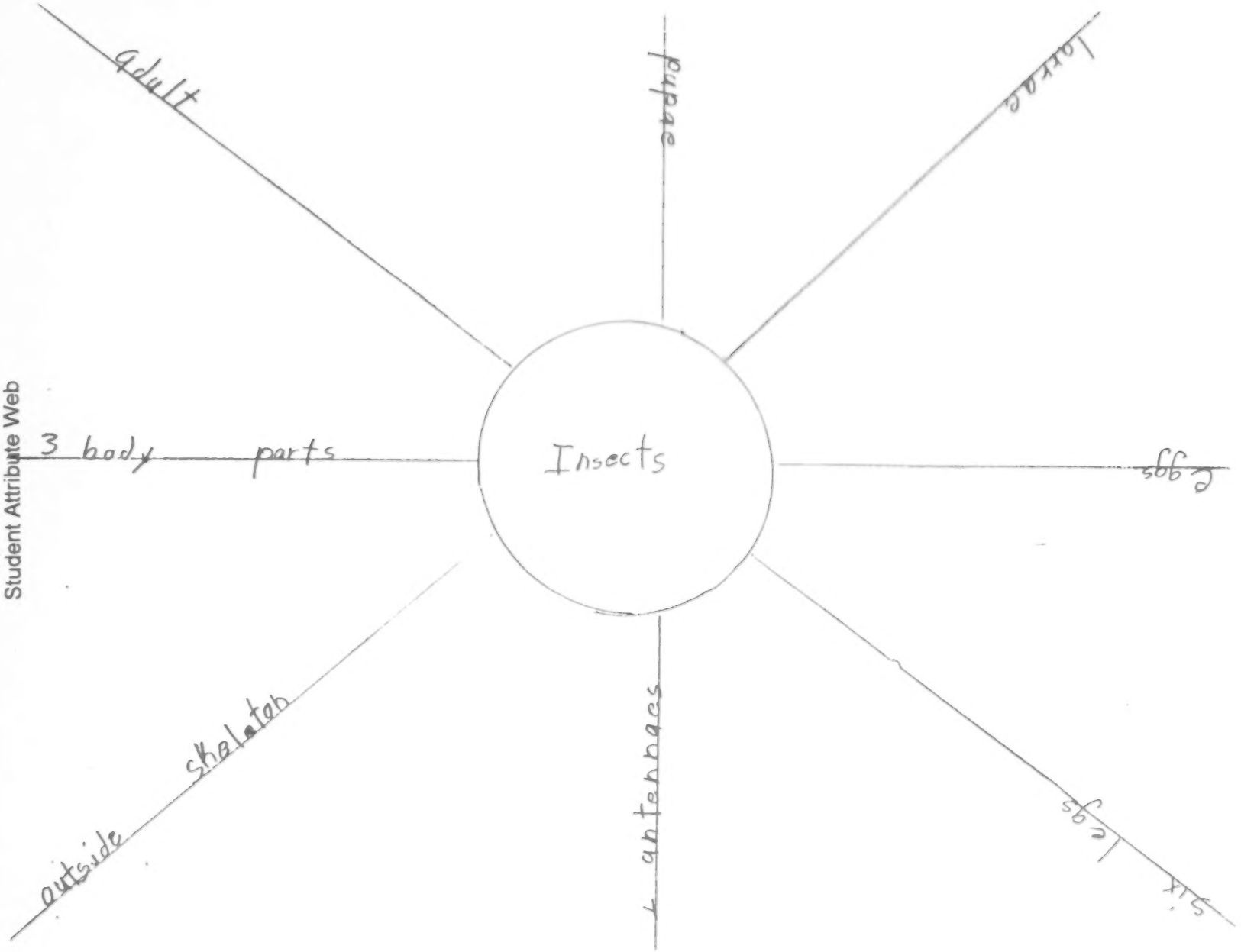
Appendix O (cont.)
Student Attribute Web



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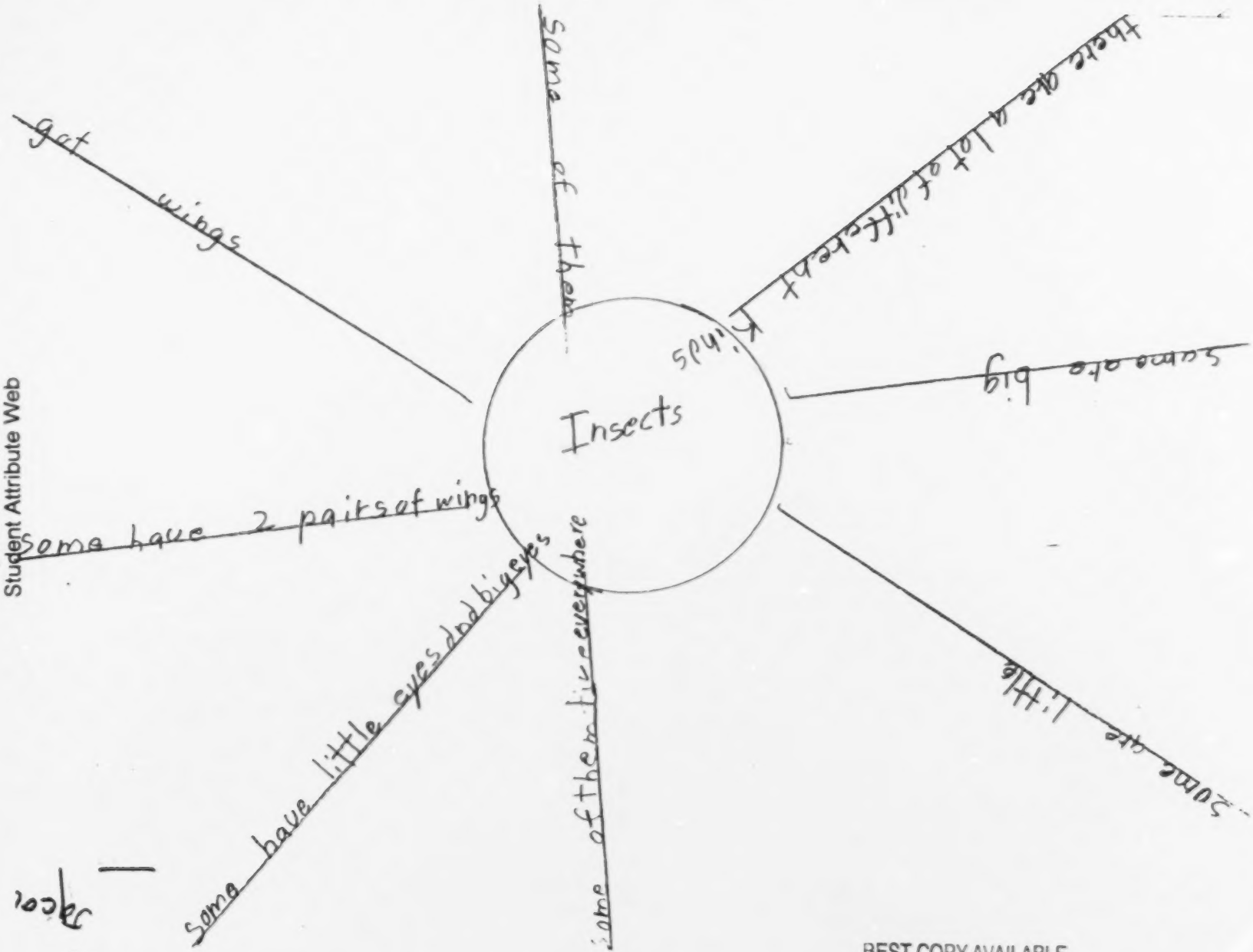
Appendix O (cont.)
Student Attribute Web


Insects
got wings
some of them
there are a lot of different kinds
some are big
some are little
some of them live everywhere
some have little eyes and big eyes
some have 2 pairs of wings

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Appendix P
Student Sample/Venn Diagram

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Appendix Q
Higher Order Questions

1. Suppose you live in a place with no snow, explain how you would build a snowman with things from your environment.
2. Why do you think people value nature?
3. Pretend you are a snowflake. Describe yourself and your journey to earth. Explain what happens to you after you land.
4. Why are machines important to people?
5. Why do people eat food?
6. List some foods that you think are unhealthy and explain the reasons you think these foods are unhealthy.
7. Create a design for a lever you could make to help do a household chore more easily.

Appendix R
P.M.I.

P+{Plus}

M -- {Minus}

I? {Interesting}

Appendix S
Mrs. Potter's Questions

1. What were you trying to do?

2. What went well?

3. What would you do differently next time?

4. Do you need any help?

Appendix T

Learning Log